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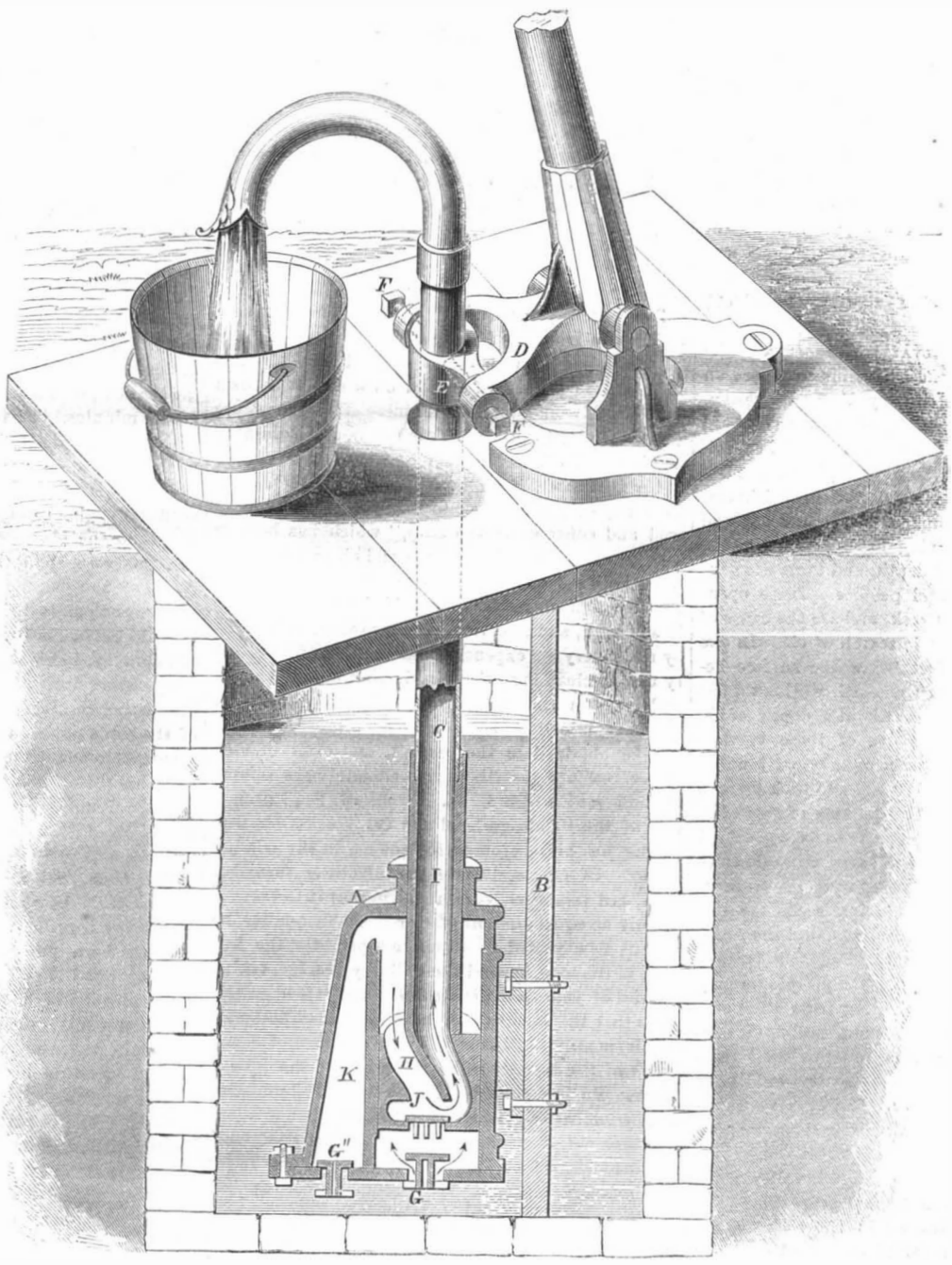
The Ohio Pump.

REYNOLD'S PATENT PUMP.



Herewith we illustrate a pump of novel construction and design. The inventor styles it "The Ohio Pump." The principal features of this invention are herewith explained:—The pump, A, is immersed in the well, and secured there by bolts to the timber, B. The casting is provided with the hollow piston and rod cast in one piece. There are two valves in the bottom of the pump casting, and one in the piston itself; these connect by the passages with the hollow rod and eduction pipe, C. The working gear of this pump consists of a lever operating the bell-crank, D; the bell-crank is forked at one end, and embraces the crosshead, E. In this crosshead the set screws, F, are tapped; they thus secure the piston rod to the working gear, and furnish a bearing on which the bell-crank arms work. When the lever is worked on the up-stroke, the water rises into the chamber through the valve, G, and the contents of the cylinder above are compelled to escape through the channel, H, into the hollow rod, I, in the manner shown by the arrows. As the piston returns the valve in the bottom of it seats itself, and closes the aperture, J; the valve, G, closing, and the valve, G'', opening, water from the well enters by the channel way, K, while the water in the bottom of the piston escapes up the rod through the pipe to the vessel placed there to receive it.

These pumps are desirable in many places, as they will force water to a considerable distance. The position of the apparatus beneath the surface of the well renders it impossible that it should freeze except under extraordinary circumstances, and all the working parts seem to be put together in a substantial manner. There are no pipes to burst in winter, and, as the pump is always full of water, it is unnecessary to work the brakes half an hour before producing any results.

The patent for this invention was procured on March 3, 1863, by Andrew J. Reynolds, of. Dayton, Ohio; persons desiring further information can address him at that place.

Food.

The digestive power of the stomach may be cultivated to some extent. Gormandizers sometimes live for years free from dyspepsia, able to dispose of a large dinner daily, but there is less power left for the voluntary muscles, as they are comparatively sluggish, and less also for intellectual operations. For a period, sometimes of several years, the stomach bears this exertion, receiving an undue share of nervous influence, while the whole system, kept in a state of perpetual plethora, is exposed to apoplexy or some form of acute disease, and is wearing out with a rapidity proportioned to the excess of stimulation and overcharging the organs. In some cases of this sort, distant parts may suffer by sympathy, and sometimes give way before the stomach.

The Bedouins (says Ritson) are a most alert and military race, and yet it is an undoubted fact that the quantity of food usually consumed by the greatest part of them does not exceed six ounces a day. Six or seven dates soaked in melted butter serve a man a whole day, and he esteems himself happy when he can add a small quantity of coarse flour or a little ball of rice.

In 1779 an Englishman described the Russian grenadiers as follows:—"They are the finest body of men I ever saw. Not a man is under six feet high. Their food allowance consists of eight pounds of black bread, four pounds of oil, and one pound of salt per man for eight days; and, were you to see them, you would be convinced that they look as if they lived on roast beef and English porter." In 1854, when the Russians surprised the world by standing against the attack of the "Allies," on the bloody battlefield of Alma were found dead Russians with their provisions in their knapsacks, and those provisions were black breadcrumbs in oil.

Dr Hamlin, who has resided more than twenty years in Constantinople, says that he is quite familiar with the habits of the Turkish porters in that city, and that they eat bread from flour scarcely bolted, fruits, curdled milk (of which they are very fond), rice cooked with some other vegetable, and about twice a week a little meat at dinner, which they eat soon after sunset. They never drink any sort of distilled or fermented liquor. Onions and garlic are largely consumed by the Turks. Dr. Hamlin knew a man who traveled extensively, and who lived upon the black bread and raw onions.—*Dr. Mussey.*

SEVERAL armor plates of French iron have been tested at Shoeburyness, England, and have been found superior to the English plates in softness and non-liability to crack when struck with shot.

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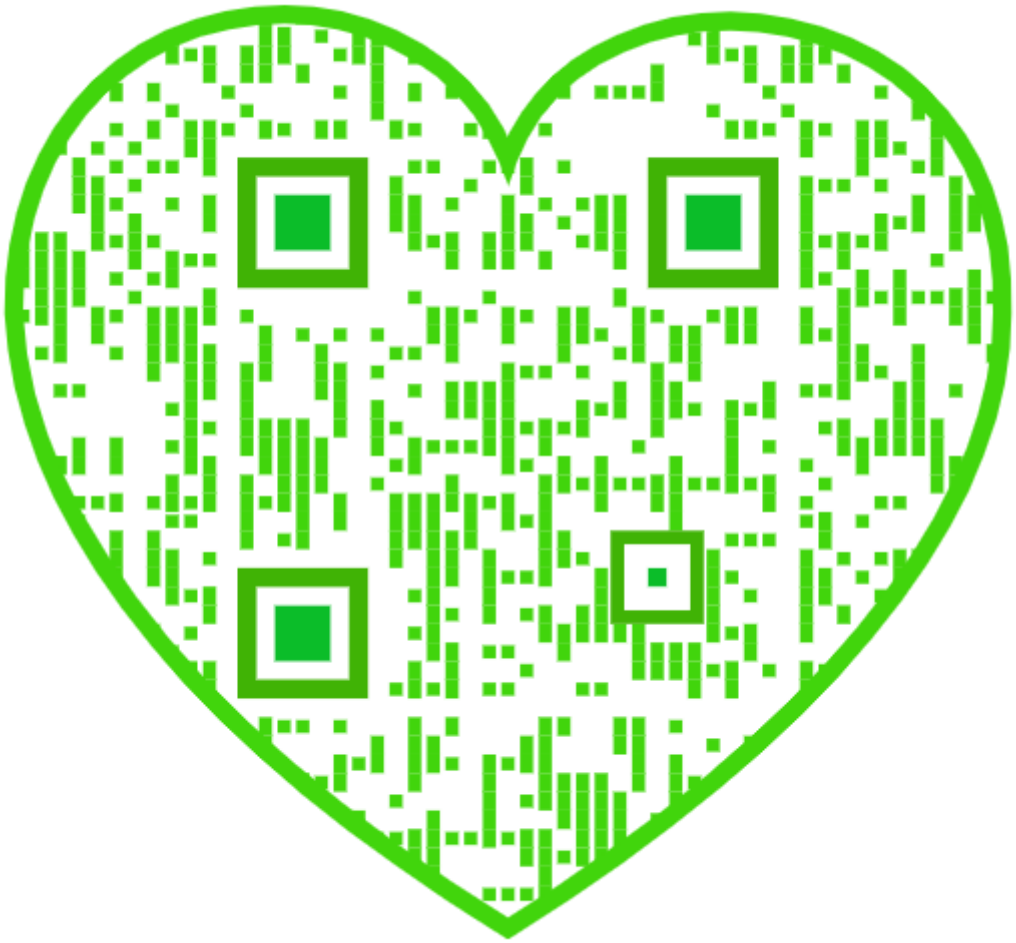

SCIENTIFIC MEMORANDA.

NEW PROPERTIES OF SULPHUR.—A small quantity of iodine, bromine or chlorine modifies the physical and chemical properties of sulphur in a remarkable manner. It becomes soft and malleable at the ordinary temperature and maintains this form for a considerable period of time. By heating a mixture of 400 parts of sulphur and 1 part of iodine to about 180°, and then cooling it, the sulphur becomes quite elastic. The iodide of potassium acts in the same manner as iodine. The iodide of sulphur thus obtained is insoluble in the sulphide of carbon. The action of bromine on sulphur is analogous to that of iodine; the color is yellow like wax and the sulphur remains quite soft. About 1 per cent of bromine is used and the compound submitted to 200° (Fah.) of heat. By passing a current of chlorine on sulphur heated to about 240° Fah., the sulphur becomes very soft and may be drawn out like gutta-percha. If soft sulphur thus heated is worked like dough, for about one hour, it suddenly becomes quite hard. These statements were lately made in a note presented to the Academy of Sciences at Paris, by M. H. Sainte-Claire Deville.

FINELY-POWDERED COPPER.—To obtain metallic copper in powder, mix a saturated solution of the sulphate of copper, add some granular zinc to the solution, and shake the mixture. The metallic zinc decomposes the copper solution and the sulphuric acid unites with the zinc, leaving the copper in the form of finely-subdivided powder. Large quantities of metallic copper in powder may thus be obtained. The clear solution of sulphate of zinc is poured off, washed well and dried for use.

THE SOURCE OF PENNSYLVANIA PETROLEUM.—The *Journal of the Franklin Institute* contains a report on the oil district of Oil Creek, by T. S. Ridgeway, geologist and mining engineer, who has surveyed the whole oil region and made a most careful examination of it. He states that at one place there is a mass of oil-bearing strata 1,200 feet in thickness. The oil-bearing strata is broken up in huge cakes of sandstones and shales, having fissures between the strata extending to a great depth, and these are generally filled with gravel and pebbles. These openings are numerous in Oil Creek, and are the cause of much perplexity to drillers in search of oil. In one case a pipe was sunk 160 feet below the surface before the permanent rock was reached, while at a few yards distant the rock was struck at a depth of 80 feet. In one place there is one of these vertical fissures in the strata where a man may walk under ground for the distance of 170 feet and look up into a vault 100 feet in hight. At a distance of about 530 feet from the surface there appears to be a great oil pool below, and for a distance of seven miles down to the mouth of Oil Creek the flowing wells rise from it. Stones taken out of the oil-bearing rocks are employed in several places for buildings, and the Academy at Waterford, Erie county, Pa., was built of such stones, about 41 years ago. The petroleum may still be noticed sometimes trickling from their surfaces. Mr. Ridgeway, from his examinations, is convinced that the petroleum is not produced from the coal-fields, because in that case it would have had to flow up hill into the oil basin. He says:—"Petroleum found in bituminous coal basins, no doubt, originates from beds of coal, but it is my opinion that the petroleum of the Oil Creek valley is the result of the decomposition of marine plants. The plants which produced the oil in the rock existed and flourished at a long period of time before the vegetation, which now forms coal-beds; they are unlike the vegetable impressions found in the accompanying shales and clays associated with beds of coal; and they grew where the flag-stones and shales of Oil Creek were laid down by salt water currents. The climate was so hot, during this age of marine vegetation, and the growth of plants so rapid and rank, caused by the supposed large amount of carbonic acid and hydrogen then composing the atmosphere, that these conditions on the face of the earth produced plants containing more hydrogen and less carbon than the plants which produced coal-beds, and hence their fermentation produced the petroleum."

THE ANTIQUITY OF MAN.—Sir Charles Lyell, the distinguished geologist, has lately produced a treatise on the antiquity of man. He infers from recent researches and discoveries of implements in various parts of Europe, that man may have lived on the earth thousands of centuries before the era of his advent according to common belief. France, England, Denmark and Switzerland, were once peopled by a race which used flint hatchets and arrow heads, like the old North American Indians. After them came a race which used implements of bronze; and again these were succeeded by a race which used implements of iron. The relics of the old races found in Switzerland are similar in most respects to those found in our Indian mounds. In one case Sir Charles Lyell shows the section of an ancient hut which had been built on the Scottish seacoast. It had been submerged by the sea for so long a period that sixty feet of marine strata had formed over it, and after this, by some convulsion or gradual upheaval of the earth, it was elevated to its former position out of the sea. This hut affords evidence of having been erected in a far remote pre-historic period; subsequent discoveries, however, may modify this conclusion. It is supposed by many persons that at a remote period America and Europe were connected by land. Professor Agassiz has arranged a collection of the weapons and relics obtained from Switzerland in the museum at Cambridge, Mass. They are similar to the stone arrow and spear heads and pottery so frequently found imbedded among oyster shells in Jersey City and Hoboken, N. J.

Flax Seed.

Too much pains cannot be taken to get seed which is fully matured and perfectly clean—free from all foul seed—both to secure a good merchantable crop, and to preserve the land on which it is sown from troublesome weeds. Farmers often experience great difficulty in procuring such seed, as no ordinary fanning mill will remove some of the worst enemies of the farmer and good flax. It was this fact, more than any other, that led to the system of "loaning seed and contracting the crop," which has been so long practiced in Ohio, Indiana and elsewhere. The linseed-oil manufacturer who receives the crop of a large section of country is enabled to select choice lots of seed, and reserve them for sowing, and then, by machinery too expensive and cumbrous for ordinary use, to clean it so thoroughly that he can gin out each year an almost perfect article of sowing seed. Of the superiority of such seed over what can ordinarily be obtained in the market, and even in seed stores, we are convinced by examining a sample of that seed which E. W. Blatchford, Esq., proprietor of the "Chicago Lead and Oil Works," is preparing for his customers for sowing in the coming spring. Of course, when a manufacturer furnishes such seed year after year, requiring for it the return of only an equal amount of merchantable quality, he cannot be expected to stipulate a price for the balance of the crop, beyond the ordinary average, taking a series of years into the account; and it is upon this basis that the business has been conducted hitherto, and it is still continued to the acceptance of a majority of the farmers in the largest flax-growing districts. In this connection we would add that, with good seed to sow, there is nothing like flax as a preparatory crop for wheat. The testimony of Ohio farmers, where flax has been extensively grown for over a quarter of a century, is explicit on this point, and to this fact we would call the especial attention of our Illinois and Wisconsin farmers, whose wheat-growing for some time has been so discouraging.—*Chicago Tribune.*

LITERATURE FOR ALL USES.—Literature has furnished an acceptable instrument for every struggle of the age. In her golden book every one has registered his vote. She is a shield to righteousness and virtue, a temple to wisdom, a paradise to innocency, a cup of delight to love, a Jacob's ladder to the poet, but also a fierce weapon to party spirit, a plaything for trifling, a stimulant to wantonness, an easy chair to laziness, a spring-wheel to gossip, a fashion to vanity, a merchandise to the spirit of gain, and has served like a handmaid, all the great and little, pernicious and useful, noble and mean interests of the time.—*Menzel.*

A New Spanish Newspaper.

El Porvenir ("The Future") is the title of a new weekly newspaper printed in the Spanish language at No. 109 Pearl street, New York. It is chiefly devoted to "Politics and Agriculture." Senor Porfirio Valiente is the editor and director. The first number presents a very creditable typographical appearance. The publication is divided into two separate sheets, one of which is denominated the agricultural section; this part contains an illustration of "Colvin's Milking Machine" (published on page 49, current volume of the SCIENTIFIC AMERICAN), together with several articles relating to agricultural subjects, designed to interest the Spanish reader. The political section of *El Porvenir* opens with a long editorial article upon the state of the country, as seen through "Copperhead" spectacles. The nature of these views will, therefore, be easily understood. The rights of the rebels and the rebellion are discussed with great respect; the "secesh" idea of State rights, and its champions in New York, New Jersey, and elsewhere at the North, are highly applauded; while censure is alone reserved for the men and parties who, with the pledge of their lives and property, are heroically standing in defense of the Union and the Constitution.

Barometrical Oddities.

A large barometer has been lately erected in the National Astronomical Observatory of Santiago de Chili. By this instrument a singular phenomenon has been observed. Humboldt had observed that the barometer rises and falls during the day in a peculiar manner, being at its maximum hight at 10 A.M. and at 2 P.M., whilst the lowest readings are between 4 P.M. and 4 A.M. The regularity of this periodical movement within the tropics is such during the year, that Humboldt could tell the time within fifteen minutes. This movement has been observed with much regularity in Santiago de Chili during the winter and summer months; but in the month of February the movement entirely ceases, showing then only the ordinary maximum and minimum hights in the twenty-four hours. Senor Moesta (of the Observatory) states that the oscillatory movement of the barometer is produced by the sun's power, analogous to that of gravitation, and that the said movement ought to disappear in the month of February, in consequence of the great variation of temperature during the course of the day. Thus the interesting result has been arrived at that, by virtue of the sun's power, a movement is manifested in the atmosphere analogous to the action of the tides; and it is this that causes the rise and fall of the barometrical column in Santiago.

Manufacturing Items.

The *Commercial Bulletin* (Boston) says:—"At the New Bedford boot and shoe manufactory, a machine for sewing together the soles and uppers of shoes has recently been put in operation, and is capable of turning out 125 pairs per day. It is a new article for that neighborhood, and those familiar with the common family sewing-machines would almost as soon take it for a saw-mill. A pegging machine is also in operation at the factory."

The machinery is now being placed in the new buildings of the print-works of O. Arnold & Co, at North Adams, Mass., and it is expected the factory will be ready for occupancy and use this month. The machinery is all of the latest and most approved patterns, and among the rest are two engraving machines, which perform the most difficult engraving on copper, equally as well as when done by hand, while in rapidity of execution there can hardly be a comparison. The cost of the buildings and machinery in complete running order will not be far from $100,000, and the capacity of the works is double that of the old print-works of that company.

IN London, at present, 110 mails pass through the pneumatic despatch tube from the station to the district post-office during the day; and not only letters but trucks of iron of the weight of five tuns have passed, and adventurous visitors now and then perform the journey with great delight.

WHEN the Prince of Wales ascends the throne of England his title will be Edward VII.

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The Gunpowder of the Confederates.

A special correspondent of the London *Times*, writing from Augusta, Ga., gives the following interesting particulars respecting the development of a most essential manufacture in the South :—"When upon the 13th of April, 1861, Fort Sumter surrendered to General Beauregard and the Confederates, not one single pound of gunpowder was anywhere manufactured in the Confederacy. A rigorous blockade of the seaports of the South was immediately commenced, through which the principal ingredient of gunpowder (saltpeter) had to be largely sucked in. At this juncture it seemed advisable to President Davis to intrust to Colonel G. W. Rains, formerly an officer of the United States Army, the responsibility of planning and building a large Government mill for the manufacture of gunpowder. For this post Colonel Rains possessed eminent qualifications. He had been professor of chemistry at West Point, and, for some years since leaving the army, he has been at the head of some large iron-works at Newburgh, on the Hudson. Augusta, in Georgia, was selected as the site of the intended mill ; and never, both as regards the person and the situation pitched upon, was a happier sagacity evinced by the President. Following, so far as he was acquainted with it, the plan upon which the gunpowder mill at Waltham Abbey (belonging to the English Government) is built, Colonel Rains proceeded to construct the works necessary for his purpose ; and the success which has attended his efforts has been such as could never have been believed before the pressure of war and privation had awakened Southern ingenuity and enterprise. The result is that, at the cost of about £20,000, one of the most perfect gunpowder mills in the world has been produced, which turns out 5,000 pounds of powder a day, and could produce double that quantity if worked day and night, and much more if worked under the exigency of a pressing demand. The cost of this powder, in spite of the costliness of the saltpeter which has been introduced through the blockade, is about 4 cents a pound, which is believed to be about the same as its cost in England. The mill has now been constantly at work for many months ; and, consequently, more powder than the Confederacy is likely to require for years to come has already been produced. There is another Government powder mill at Columbia, in South Carolina, working, I believe, to supply the wants (not very large as yet) of the Confederate navy. But all the gunpowder issued for the service of the Confederate armies of Virginia and the West, and also for the defense of Charleston and Vicksburgh, has come out of the mill at Augusta ; and it was stated to me by an ordnance officer in Charleston, that the powder which he had recently received there and tested was very nearly, if not entirely, up to the standard of the finest English manufacture."

[The Colonel Rains above referred to, is an old patron of the SCIENTIFIC AMERICAN, and has had frequent occasion to employ our services in prosecuting applications for patents in this country and Europe. He was for a long time one of the proprietors of the Washington Iron-works, at Newburgh, N.Y., and was possessed of considerable scientific and mechanical information. He bears the honored Christian name of the "father of his country," and is a gentleman in bearing and manners. We regret and are exceedingly surprised that, having been educated under the paternal care and at the expense of the United States, he should thus employ his talents for the benefit of those who are doing their utmost to overthrow the Government. We have no confidence, however, in the statement that he has succeeded in making gunpowder at 4 cents per pound. John Bull may believe it if he chooses, but we decline to accept the statement as true.—EDS.

Why Hens do not Lay.

A correspondent of the *Country Gentleman* suggests the following reasons for the non-productive qualities of hens. His experience is worth noting :—

"I am not in the habit of writing for publication, but I have a few remarks to make from my own experience. Last spring I had sixteen hens of the Dorking breed, and they did not lay. I did all in my power to make them do so, but nothing effected a cure. I gave a great variety of feed—burnt bones, shell, &c.; also tried many things recommended in your valuable paper for that purpose, but all were of no use. I did not like to part with them, as they were favorite fowls of mine, and highly esteemed for the breed. Lastly, I gave up in despair—thought there was no use of keeping hens to look at, and receive no profit. I then commenced to kill them, took the poorest first, and dressed one, and it was the fattest fowl I ever saw, and no signs of any eggs. I then made up my mind that the hens were too fat to lay, and commenced immediately to starve them a little, which caused them to lose some of their flesh, and in due time they commenced to lay. Since then they have done well."

Our Specie.

The following is from the San Francisco *Mercantile Gazette and Prices Current* :—

The total treasure export of the United States to foreign countries last year, including our own, was not less than $95,000,000, and probably exceeded $100,000,000. Estimating the total products and imports to be $70,000,000, which, however, is admitted to be a full figure, and we have a reduction of but $30,000,000 from the amount existing in the country on the 1st of January, 1862; this, after the most careful investigation, we judge to have been little short of $500,000,000, in one form or another. We are aware that these figures exceed official estimates, and a portion of our data is imperfect; but they are chiefly drawn from public documents.

The total amount of specie on hand in the United States in 1820 was estimated at..	$32,000,000
Total imports since that date and up to June 30, 1861, in round number.....	405,000,000
Total product from all domestic sources, except California, up to June 30, 1861.....	20,900,000
Total product of California mines up to the above date, including amount received at the Mint and branches and amounts received and exported in dust and bullion, without passing through the Mint.....	753,000,000
Total receipts.....	$1,210,900,000
Total amount of exports up to June 30, 1861	723,300,000
Balance in the country on June 30, 1861....	$487,600,000

The foregoing is a brief abstract of calculations made by us in August, 1861, and predicated upon the most reliable information within our reach at that time. Subsequent examinations tend to confirm it in all material points. The statistics must be very nearly correct.

The total value of manufactures from the precious metals during the year ending June 30, 1860, was in round numbers $20,000,000, of which, however, the mechanical labor constituted the greater portion, probably not less than two-thirds. But these manufactures have not long been in progress upon so extensive a scale, nor anything like it ; and taking an average of the forty years embraced in our calculation, the consumption of gold and silver for these purposes would not probably exceed two and a half or three millions per annum. The total immigration from foreign countries since 1820 has been about 5,000,000 souls, embracing large numbers possessed of abundant wealth. It can hardly be deemed credulous, therefore, to believe that this vast multitude have brought with them a much larger amount of gold and silver, in one form or another, than has been carried away in private hands during the same period.

But while our figures exceed those of Secretary Chase, they fall far short of the estimate of S. Hallet & Co., bankers, of New York, who place the total amount of treasure in the hands of the people and on deposit at nearly $800,000,000, which is in keeping with other portions of the circular in which we find it. The old adage that figures will not lie has been long since exploded.

Rhode Island Statistics.

The following interesting statistics are taken from the "Transactions of the Rhode Island Society for the Encouragement of Domestic Industry, in the year 1862" :—

"The population of the State, in 1860, was 170,688 whites, 3,952 free colored ; total, 174,620. The rate of increase from 1850 to 1860, was 18.35 per cent., and larger than for any other period except from 1840 to 1850. The area of the State is less than any other State in the Union, being only 1,306 square miles. The population per square mile is 138.71, and larger than any other State except Massachusetts. Though small in size and population, Rhode Island compares well with her sister States, in the products of industry, for the year ending June 1, 1860; as instance the following :—The value of steam engines and machinery produced, was $1,068,825, larger than any of the New England States except Massachusetts and Connecticut, and the eleventh of all the States. Boots and shoes, $315,959, the smallest of the New England States, and the twenty-first of all the States. But then the rate of increase for the last ten years was 327.2 per cent., and larger than any State except Iowa. Jewelry, silver ware, &c., $3,006,678, larger than any of the New England States and the third in the United States. Woolen goods, $6,599,280, the second of the New England States and the fourth in the United States. Cotton goods, $12,258,657, the third in New England and in the United States. The whole of the products of industry, as distinct from agriculture, were $47,500,000, the third in New England and the tenth in the United States.

"With an area of only 1,306 square miles, this State cannot compete with her sister States in the products of agriculture. Her whole area will not equal the improved acres of many of them. Neither industry nor enterprise can supply her with land, the raw material for agriculture. There is no such limit set to manufacturing industry ; it was supposed to be limited in a given territory, in some degree, by the water power in that territory ; then came the steam engine, and the supposed limit was found to be no limit at all. Then, again, it was said that the steam engine could be employed only in certain localities and for a definite period, as fuel would be exhausted. The unlimited coal beds of this country at once removed this difficulty, and the only bounds now admitted are human wants and human ingenuity, and when the first are fully supplied and the other overtasked, we may look for a great falling-off in the products of industry."

Sterro-metal.

Bronze is a term applied to compounds of tin and copper ; while compounds of zinc and copper are called brass. These metals in varying proportions form the most common alloys ; still there are many others, and the numbers of such is always on the increase. As various metals may be mixed in different proportions, and as a slight variation in the quantity of any one component produces a new alloy of a different character, the number and quality of alloys may be extended indefinitely. The new alloy called "sterro-metal," is composed of pure American copper 57.63 parts by weight, spelter (block zinc), 40.22 parts, iron 1 86, tin 0.15. It has a brass-yellow color, a close grain, and is susceptible of a fine polish. This alloy is stated to possess great strength, a square inch of it after being forged while red hot, sustained a strain of 28 tuns before it broke. It can be drawn cold and forged like iron. The tensile strength of common gun metal is only 17 tuns per square inch, which is but little more than half the strength of sterro-metal.

SEA-WEEDS FOR MANURE.—Vast quantities of sea weed are sometimes driven upon shore along the Atlantic coast and used by farmers as manure by applying it direct to the soil ; but the Irish *Agricultural Review* states that a method of preparing it has recently been patented and introduced into Ireland by Mr. J. McArdle, which is a great improvement over the old method. It consists in the fermentation of the weeds, by which a portion of the organic constituents is eliminated, and the rest forms a kind of mucilaginous matter, which dissolves easily in water. From this solution or rather semi-solution of the altered weeds, all the saline matters are separated by crystallization, and without undergoing any change whatever in their nature.

EXPORT OF WESTERN GRAIN.—In the year 1860 New Orleans exported, of North-west grains, 226,000 bushels ; and New York 3,500,000 bushels ; flour, New Orleans 80,000, New York 1,250,000 barrels ; provisions, New Orleans 15,500,000, and New York 98,500,000 ! Thus it will be seen that, in ordinary times, more than ten times as much grain found its way to the seaboard by way of New York as by way of New Orleans, and since the war broke out it has all been sent by way of the East.

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The Effect of Shot on the "New Ironsides."

Through the attention of an officer on board the *New Ironsides* we are enabled to present our readers with a diagram of the effects of the rebel shots which were fired at that vessel during the recent attack on Fort Sumter. The injuries were very slight; the vessel was struck in all about ninety times, we are told, but the most serious damage she received is here depicted. Previous to describing the diagram we will let our correspondent tell his story in his own way :—

MESSRS. EDITORS:—We have had a fight with Forts Sumter and Moultrie, but as there was a reporter for one of the New York papers on board, I will not go into a description of it, except to speak of the effect of the shot on our plating. In reference to the *Keokuk* I will state, primarily, that I was informed by one of her crew that she received eighty-nine shots through her plating, fifteen of which were below the water line, also that a 32-pounder pierced her bow. The *New Ironsides* received very little injury; the worst being the loss of one of the iron port-lids; it was knocked off by a rifle shot supposed to have been fired from Fort Moultrie. I examined the iron, and it appears to be crystallized, as the break was short off, although it was in the weakest part. Our plating stood the test very well, as the shot that struck seem to have broken into pieces. There was a rifle shot taken out of our stem, where it had buried itself in the wood. Enclosed please find a rough sketch of some of the marks which the *New Ironsides* received.

Fig. 1 is a representation of a spent rifle shot found in the wooden stem of the ship after the engagement. The body of the shot is 6 inches in diameter and 10 inches in length, and is, as the reader will discover, a most formidable instrument for offense. The bands at the base and the forward end produce—the one—the necessary rotation to the missiles by expanding into the grooves, the other centers the shot in the bore of the gun so that its flight will be true after leaving it. The piercing end of the missile is rounded, and it is in all respects the very counterpart of those projectiles which inventors at the North have experimented with and proved to be the most effectual against armor; thus showing conclusively that the rebels have full and early intelligence of every mechanical novelty of merit. Fig. 2 is a section of the inclined armor of the *New Ironsides*, showing the indentation of the shot at A, and also the wooden backing of the plates at C and D. The shot broke in pieces and flew off without penetrating or disturbing the backing, although it came very near it. Fig. 3 is a view of the broadside of the ship, and shows several scars. The port-lid, A, was broken off and lost overboard, by being struck at B, near the point of support, by a rifle shot. The plate, E, was struck by a round shot at D, which cracked the armor in the line, C; the shot made an indentation one inch deep by actual measurement. The fractured port-lid was also struck, before it was finally detached, by a round shot at F. The shot carried away the edge of the lid, and, striking the main armor, glanced off and made the long "blaze" at G. The plate, H, was struck at J by a rifled shot, which glanced off after breaking the plate on the line, K, also scarring the timber backing; the armor ends at that point. One rifle shot also struck on one of the bolts that hold the plating to the ship, and made an impression two and a half inches in depth. Some of the rifled shell of the enemy entered the *New Ironsides'* bow, but were prevented from doing any damage by the precaution of the commander in placing sand bags at that point. Without this protection the shells would undoubtedly have done considerable damage. The ship ought to be as completely iron-clad as the *Roanoke* is. She would then be more effective against an enemy than in her present condition.

The *New Ironsides* is not completely iron-clad, but only on those points covering her broadsides; the bow and stern are left undefended, as in some of the English vessels. She took an active part in the fight at first, but afterward fell back out of range, being unmanageable. The channel is tortuous at that point, we are given to understand, and the ship could not obtain sufficient momentum to get steerage way on her. We are unable to say at what range the rebel shot took effect on the *New Ironsides*, nor do we know what charges of powder propelled them. That they struck at a low velocity, however, must be inferred from the fact of the rifle shot sticking in the wood work. The ship was also unable to deliver her broadsides with good effect, and fell back as before stated. When all things are more propitious than on the last occasion, we do not doubt that the ship and the brave fellows who command and man her will give a good account of themselves.

Fig. 1.

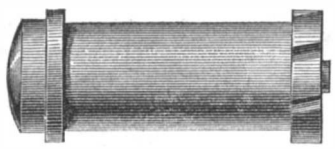


Fig. 2.

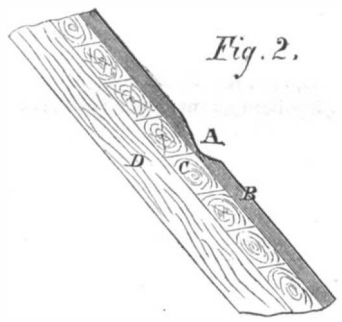
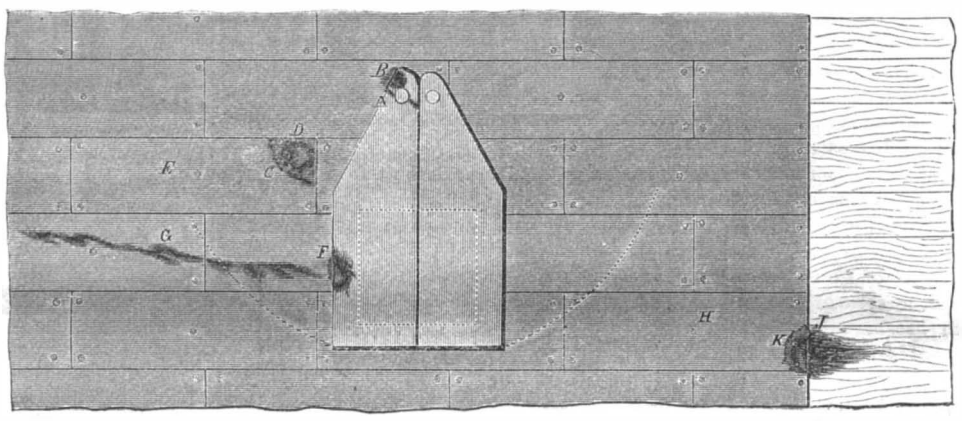


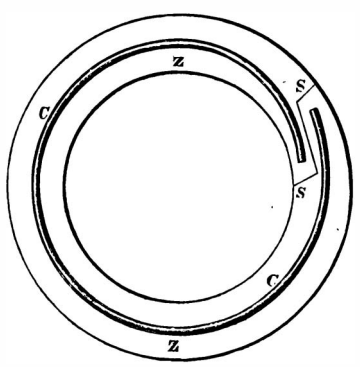
Fig. 3.



THE SHOT-MARKS ON THE "NEW IRONSIDES."

GALVANIC SLUG AND SNAIL SHOCKER.

"Having a few pet plants which slugs and snails are particularly fond of as food, I have devised the following simple and efficacious mode of protecting them against their and my enemies; and as this plan may be useful to some of your readers, I herewith send you a description of my galvanic circle. Procure a



flat ring of zinc, large enough to encircle the plant; make a slit in the ring after the manner of a key-ring, so that it can be put round the stem of the plant and then rest upon the ground. Now twist a copper wire into a ring very nearly of the same circumference as the flat zinc ring, and putting it round the plant, let it rest upon the zinc, as in the illustration. No slug or snail will cross that magic circle; they can drag their slimy way upon the zinc well enough, but let them but touch the copper at the same time and they will receive a galvanic shock sufficient to induce them at once to recoil from the barrier. It will, of course, become evident that mural fruit can in a similar way be protected by fastening along the wall two narrow ribbons of the metals mentioned. Other applications of this principle will doubtless be made in many gardens as the occasion arises. In the illustration Z Z is the zinc, S the slit in it, and C C the copper wire."—*Septimus Piesse, Chiswick, London.*

Science of Smelling.

It is evident to thinking persons that the influence of odors upon the olfactory nerve are not of chance or accident—in truth, all the physical faculties of man are alike governed by immutable laws in harmony and in analogy with each other. Experiments are being prosecuted with earnestness, and gratifying results are obtained, establishing the fact of the perfect analogy between the laws of vision, smelling and hearing.

As there are primitive sounds and primitive colors so there are primitive odors. The primitive colors are now well known to be violet, indigo, blue, green, yellow, orange and red—seven in number, as established by Newton. The primitive sounds are indicated in music by the signs E, G, B, D, F, A, C—also seven in number. The primitive odors, as evolved from plants, appear also to be seven; these are camphor, lemon, jessamine, rose, almond, clove and santal. All perfumes from flowers are either analogies of these primitive odors or are harmonious combinations. As there are various shades of one color and various pitches of one note, so there are definite octaves of the primitive odors. Actual experiment establishes that there are several octaves of lemon, also of the almond and camphor. To the present I have discovered but two octaves of the rose and one only of the jessamine. Experiments are in actual course with clove and with santal, of which there does exist known analogies, or octaves, or shades, but their number is not yet defined, but certainly exceeds six.

The relative volatility of odors has an important bearing as to their influence upon the olfactory nerve, as also does the action of oxygen upon them. Rapid volatility may be likened to the high vibrations of a string. The action of the atmosphere destroys all color-producing colorless compounds; so with the strongest odors, they eventually succumb and become inert.

Though a great deal has been done to the several parts wherewith eventually I hope to construct a true theory of odor, yet there is much more to do. Light, heat, electricity—immaterial agents—are best explained by assuming their materiality; sound can only exist in connection with a material body. Assuming odor to be an immaterial agent, then we can explain many of its phenomena without difficulty.

A correspondent of the SCIENTIFIC AMERICAN, in a letter published on page 166, current volume of that journal, speaks of me as "*M.* Piesse." I claim my birthright; I am an Englishman, and have nothing in common with Frenchmen, but that my ancestors came to this true land of liberty at the revocation of the edict of Nantes.—*Septimus Piesse.*

MR. FAIRBAIRN states that of two tubes of the same diameter and quality of metal, but one twice the length of the other, the shortest will resist double the pressure of the other. The collapsing pressure, other things being the same, varies inversely as their lengths, and inversely as their diameters. Experiments made with elliptical tubes showed that in every construction where tubes have to sustain a uniform external pressure, the cylindrical is the only form to be relied upon, and that any departure from the true circle is attended with danger.

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OUR INDUSTRIAL ESTABLISHMENTS.

Many persons, unacquainted with the state of the arts and sciences in our country have deemed it impossible that we should be foremost in the production of rare and beautiful articles of *vertu* or should succeed in emulating the most costly French bronzes, chinas, glass and such fragile articles. Such is the fact, however, and we need no longer look abroad for tasteful decorations to our houses, halls, libraries and public edifices of every kind. In this city all the above-mentioned articles are manufactured and many others which we have not included in our list.

The various mechanical and artistic productions in the country, and particularly in this city, have a great charm for us, and we frequently furnish our readers with descriptions of some of the processes by which they are made. The stroller in Broadway sees costly warehouses on both sides of that street, piled high with glittering silver, china and glassware, and so beautiful are the articles that, as he stops and gazes, he assumes, as a matter of course, that they were imported. In some instances the inference is true, but in the great majority of cases the articles are of home production, and vie with, if they do not excel, foreign wares. In bronzes we are undoubtedly behind the French; but this is wholly owing to the value of labor in this country, which prevents them from being made at remunerative prices—not, as some would argue, from a lack of artistic taste and cultivation. In the manufacture of beautiful glass, however, we are unapproachable. Certainly, no refined person, gazing with admiring eyes upon the prismatic splendors of the flint glass made in Brooklyn, could wish or hope to see finer. So also with the engraving and cutting, which relieves the plainness of the exterior; the delicacy of execution and elegance of the designs—made in this country—cannot be excelled abroad. In silver ware and cutlery and, in fact, in every branch and appliance necessary to elegant housekeeping, we are fast gaining a most enviable reputation.

One of those large warehouses—that of Messrs. E. V. Haughwout & Co., 488 Broadway—was recently visited by us, and we propose to give a brief account of what we saw. Passing directly through the large warerooms on the first and second floors, filled with beautiful works of art, we ascend to the workshops. Under the guidance of a gentleman connected with the establishment we enter a long workroom wherein a number of artists are busily engaged in decorating china—occupied in putting on those brilliant shades of color so much admired, and also with the delicate wreaths of flowers and representations of scenery which adorn a modern table-service. The process is very similar to that of ordinary designing and sketching in color, with the exception that after the pigments have been applied they must go through the process of baking or burning in a furnace in order to fix them indelibly on the china. The colors are metallic, and the fixing of them under the high temperature of the furnace causes them to unite with the silex or "glaze," as is now popularly termed, on the surface of the ware. These colors are applied on a peculiar varnish, with a sponge, and the plate or dish is then ready for the furnace. After remaining until the colors are fused the ware is taken out and carried into another apartment where the gilding, if there be any upon it, is burnished by being rubbed with steel tools. The gold before being baked in the furnace looks like tar, but, on the application of heat, the agent which held the precious metal in suspension is driven off and the gold is left behind. Much loss sometimes occurs in this branch of the business, and a very thorough knowledge and attention to the several details is required. Messrs. Haughwout & Co. introduced this branch of the decorative art into this country as long ago as 1847, and they have given very many evidences of their progress since that time.

Passing over other departments of interest we come to the room where the gas fixtures or chandeliers are made. The designs of these we have seen below in the show-room, and they comprise every beautiful and unique pattern in vogue. Most, if not all of them, are constructed in the rooms above. The arabasques, scrolls and the several component parts, are first cast and then bronzed or gilt, as the nature of the design demands; these parts are then put together with screws. Many parts of the chandelier are made in the lathe, and we saw several men actively occupied on the individual pieces; and we can say that, mechanically, the work was well done.

Large quantities of the most excellent table-cutlery are annually produced in this establishment; and we examined the rough forgings from which they are made and also the finished articles and found them each excellent. The blade of the knife is made from steel hammered out and then ground down to the proper shape on heavy stones; the blade is then finely tempered in an oil bath and, if it is to be plated, goes to the department assigned for that duty. The handles of the knives are of ivory, pearl or any other substance desired, but the finer knives have the first-named materials fitted to them. The ivory is at present very dear, and the reason given for this is that few ships are fitting out for the Coast of Africa, owing to the high price of cotton goods and the artificial value of gold; these two articles of commerce being those which are given in exchange for the ivory. The knife handles are sawed out of the ivory blocks; those blocks are obtained from the tusks by sawing them to the right size, and the pieces thus produced are drilled for the reception of the tang or end of the knife blade which goes into the handle; afterwards they are polished and made ready for market. An apt illustration of the economy practiced in the arts was pointed out to us in the disposition of the ivory shavings remaining after the operations. These raspings, we were informed, make a very excellent *jelly*, when purified and nicely flavored! We never, to our knowledge, ate any gelatine prepared from elephant's tusks, but we can readily see how, if the gluten was extracted from them, an edible might be produced whose delicacy would, of course, be dependent upon the degree of culinary skill attending its manufacture. The refuse ivory is also a very valuable fertilizer and large quantities of it were formely sold for that purpose. The knives in the finished state present a very handsome appearance and cannot be excelled by any imported.

In the room devoted to glass-working we found a large number of operatives cutting the most beautiful designs upon glass goblets, preserve dishes, decanters, in fact all varieties of utensils which are formed of this substance. Some of the patterns shown were extremely tasteful and skillfully executed, and we particularly remarked the play of light which scintillated from each glistening angle and corner of the tracery. The process of cutting glass has been fully described in articles previously published in the SCIENTIFIC AMERICAN.

In the silver-plating department all the forks, spoons, salvers, goblets and dishes are heavily coated with silver by the means of an electro-plating bath. In this bath all articles are suspended and the deposit is formed on them by galvanic currents. The fork or spoon is first made from German silver, and the time of immersion in, and contact with, the silver in solution determines the thickness of the coating. When the articles leave the bath they are of a dead frosted white; this appearance is subsequently relieved by the burnishers; these are young women who—provided with a blood-stone set in a wooden handle—rapidly rub over the surfaces it is desired to brighten. The friction produces that brilliant luster so universally admired in silver-ware.

The Messrs. Haughwout & Co., have been engaged for a long time in a series of experiments respecting the feasibility of producing salvers elegantly designed and engraved by the electrotype process; and from a small plated salver which we saw at their establishment made in this manner, they seem to have been successful. An electrotype of the "Declaration of Independence" was shown us; it had very sharp and clear lines, and the signatures of the honored names thereunto attached were reproduced in the most faithful manner. We are assured and can readily conceive that the process, successfully applied, will have the effect of very much reducing the cost of plated-ware, while the quality of the articles are greatly improved.

We here conclude our observations, for to describe at length and in detail all of the operations would require vastly more space than we could spare. We have only adverted briefly to the more important branches and have left others unmentioned. From the above description our readers will receive the only impression that we desire to give them, viz., that in the manufacture of beautiful works of art, as well as in the production of the more substantial ones, we are fast developing our immense resources, and acquiring thereby an additional importance in the eyes of the world.

PHYSICAL EDUCATION.

Seldom have we spent an evening to greater advantage than one lately passed in listening to Dr. Dio Lewis's lecture on the new system of calisthenics which he has introduced. If the truth must be told, we went prepared to hear and see something which we could not commend, and we sat through the first portion of the lecture while two speakers gave their views upon the subject under discussion. Dr. Lewis explained with much force, and a refreshing fertility of illustration, his position on the culture of the dormant powers of the body, and expatiated in interesting and fluent speeches on the practical difficulties under which the old systems of gymnastics were applied; and the audience, entering most heartily into the spirit of the lecturer's theme, applauded to the echo. And why? Solely because without stunning the people's brain with technical terms, with "words of learned length and thundering sound," with dissertations upon the flexors and extensors, the forearm, the biceps, and what not, he told them plainly in a few words wherein they erred and what the proper course should be. Common sense, as applied to the care of the physical man, is a great virtue now-a-days, and he who imparts it to the people, by precept and by practice, is a benefactor indeed.

A pleasing feature of Dr. Lewis's entertainment was the introduction on the stage of a class of ladies and gentlemen appropriately attired, who performed certain exercises calculated to exemplify in a marked manner the benefits accruing from an observance of the lecturer's principle. These exercises consisted of a variety of posturings, and in swinging the arms up and down in various ways, so that every muscle should receive as much attention as its importance and position in the body demanded. One great fact that Dr. Lewis urged upon the attention of his hearers was that his system neither embraced or contemplated heavy lifting or severe straining in order to accomplish—nothing. Merely tugging at a huge dumb-bell, and grunting and groaning to elevate it a few inches above one's head, and then immediately replacing it upon the floor, the lecturer said is a very stupid thing to do, and more injury than benefit is likely to ensue from such a course. In this sentiment every sensible person will concur. The exercises of the evening were thus varied by alternate discussion and practical example, and the audience seemed fully impressed with the necessity that exists for invigorating their physical systems by stated periods of thorough and intelligent discipline. How many of them will act upon the suggestions thrown out, is another question which we cannot discuss; advice is so very cheap that few will take it, but he who neglects it when it is practical and sensible, as it was in this instance, will surely bemoan his folly when too late. Few men are so unreasoning or so blinded by prejudice but that they will admit that the education of the physical powers is just as necessary to the health of the human body as the cultivation of the moral ones are to the proper development of the brain. And it is to provide such a system and to call attention to the importance of the subject that Dr. Lewis has given his time and talent. That he may be rewarded by seeing a newer, stronger, and more healthy generation arise is the wish of every real lover of human progress. One of Dr. Lewis's pupils, Mrs. Plumb, has opened an academy at 59 West 14th street, in this city, where the principles set forth by the lecturer are practiced, and we would earnestly recommend those in search of health to give attention to the subject.

THE *Commercial Bulletin* says:—The Lowell (Carpet) Manufacturing Company have increased the wages of those employed by them in many of the rooms, ten or twelve per cent. The directors, at a meeting held a few days since, voted to make the increase commence with the last payment; and the first indication that most of the operatives received was the payment of their increased wages.

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Correspondence

The Boiling of Water and Steam-boiler Explosions.

Messrs. Editors:—I have read with much surprise an article originally published in the *Providence Journal*, and republished in the Scientific American (on page 196, current volume), upon boiling water freed from air being a cause of steam-boiler explosions, and I have also read your editorial comments upon that article, on pages 201 and 217. Believing that the article has a direct tendency to mislead engineers, and would, if adopted as a theory for steam-boiler explosions, be productive of the worst consequences, I rely upon your uniform courtesy heretofore extended to me, to publish my protest against sending abroad such a theory, and especially supported as this is by the sanction of the Scientific American.

In my opinion, in ninety-nine out of a hundred explosions, the cause is directly the consequence of low water in the boiler; in other instances defective boilers, either in form, workmanship, poor material, or injury from rust or use, but then seldom if ever with great violence. It requires immense volumes of vapor generated inside of the boiler so suddenly that the safety valve cannot relieve it finally to burst the shell by which it is confined. The effect of low water in a boiler is to lay bare and uncover the internal surfaces, flues, &c., leaving them exposed to the action of the fires from the furnace passing around and through them; if this is continued these surfaces become unduly heated, and, of course weakened, when, by some change in the position of the boat or by lifting the safety valve to force water into the boiler, or lifting the valve to start the engine, water is thrown over these heated plates and steam is suddenly generated; and if there is more steam generated than the boiler can hold, it must burst; this is generally determined within two or three revolutions of the engine. In this lies the plain, simple and unmistakable cause of explosions. It cannot be evaded, denied or controverted; it may be attempted to mystify it by wise-drawn theories of "boiling water freed from air" bursting into terrific explosions—based upon a doubtful statement of a little-known Donney, who has since sunk into obscurity.

The effect of opening a valve upon a steam boiler can hardly be appreciated by the uninitiated. The rush of steam and water toward the opening in such cases affords a spectacle of the greatest interest. Every engineer ought to provide himself with a glass boiler, or a boiler with a glass dome, to witness this remarkable exhibition. He will then see how water may be thrown over the heated flues of a boiler, and how steam may be suddenly generated in sufficient quantity to produce explosions of the grandest character. Every engineer of any practical experience knows how fast water will waste away in the boiler while the vessel is lying at the dock. He knows that it rapidly disappears, no matter how apparently tight the boiler may be; the pump must be worked to make up this almost unaccountable waste; if it is not, as in the recent case of the steamboat *Crary*, he will sooner or later be reminded of it in peals of thunder, not to be mistaken. In reference to this particular theory of water freed from air being likely to explode on being converted into steam, let me say that there is hardly one boiler in a thousand where the feed-water to the boiler is not freed from air in passing through some kind of heater. The very effect of boiling water frees it from air. To prove this, take a sample of water thus heated, and after it is cooled, put into it a live fish; it will die instantly, simply because the atmospheric air, which is necessary to its life, has been expelled.

In condensing engines, where the water is taken from the condenser, it is freed from air pretty perfectly, because it passes into a vacuum instead of escaping, as it does in the non-condensing engine, under the pressure of the atmosphere. Now, first, we are told to provide some perfectly pure water, freed from air, in a perfectly clean glass vessel, and apply heat equally to every part of the bottom, &c.; then we are told that no ebullition will take place until reaching a temperature somewhere from 220° to 300°, and it will then explode; and from this very questionable assertion we are asked to believe that this is a true explanation of the cause of steam-boiler explosions.

I contend, in the first place, that the statement is not true; if there is any difference, it is so small as to be a matter of no moment one way or the other. I would much rather, if there is any truth in it, adopt the views of M. Magnus (see Bourne's last edition on the steam engine, page 80), that pure water, without any admixture of foreign particles, has its boiling point slightly above 212°, whilst water with particles of dirt may boil at 212°. There is an approximation to the pure water freed from air, in boilers using water from surface condensers, and it is absurd to suppose they are any more liable to explosion than others.

Let me introduce proof of the soundness of my views of the cause of steam-boiler explosions—no more conclusive and satisfactory proof, in my opinion, can be required:—Congress, in 1852, passed laws to provide for the better security of the lives of passengers on board of vessels propelled by steam. At that time explosions were of almost every-day occurrence, and sometimes of such frightful character that the country became justly alarmed, and this law was passed to prevent them, if possible. In this law there is a provision that the water in the boiler shall never be allowed to fall to less than four inches above the flues. Penalties of the severest character were to be inflicted upon engineers who should, under any pretext, be guilty of violating this provision, and masters and owners are punishable for navigating a steamer without ample provision at all times to keep up this supply. What has been the result? Why, steam-boiler explosions are almost unknown where they were once so common. Among licensed engineers, and upon inspected steamers, scarcely a single explosion in the whole country has occurred during the last year, and for the last ten years very few. In every explosion that has occurred, the investigation has proved it was from low water. All intelligent engineers now understand this well enough, and it is useless to attempt the revival of any fossil theories to excuse the ignorant or reckless engineer from the performance of his proper duties—no others are likely to have explosions.

A. Guthrie.

Chicago, Ill., April 20, 1863.

Is the Sun a Habitable Sphere?

Messrs. Editors:—The sun's envelope, according to my observations, is composed of three layers of different characteristics—the outer photosphere or luminosity, the underlying penumbra of a greyish color, and a thin cloud stratum. These three layers lie upon contiguous plains, like the coatings of an onion; the two first as a compact material of about equal thickness, and each of about the same thickness as shown by their edges when a spot breaks through, as that of the edges of the lines of faculæ seen on the luminous surface. The third or cloud stratum is superficial in thickness, and resembles a diffused fleecy cloud, dusky in color, and when a spot breaks down through this cloud stratum, which is not always the case, such portion of the spot is of an intense black, by contrast with the color of the cloud stratum. Faculæ lines do not rise above the luminous surface, as frequently named, but are only the edges of the depressed luminosity, when that breaks through the whole or part of its thickness, preparatory to exhibiting the penumbra beneath, which is generally followed by a parting of the penumbra also, and the formation of a spot. Over the whole luminous surface of the sun, not temporarily occupied by spots, or areas within concentric fecula lines, there appears a network of depressed meshes, slightly darker than the dividing ridges, which gives a finely-divided net-work appearance to the general surface. The luminous surface or photosphere of the sun is probably electricity (positive), developed in virtue of being the center of a system of revolving planets and satellites; the sun imparting this positive or repellant electricity to all the planets and satellites, and receiving in return from them, when exhausted of its positive character, negative or attractive electricity; thus reciprocally maintaining the planets and satellites in their required orbits, and inexhaustibly maintaining a supply of light and heat, without possible change or extinguishment. If light existed as such in the photosphere of the sun, then it would be developed in space, darting off to the separate planets and satellites of our system, which would be visible at night from our globe, and thus prevent nocturnal darkness of the heavens or earth; but as no such appearances present themselves, it therefore follows that this photosphere or luminously-appearing surface of the sun is but the undeveloped storehouse of light and heat—not really active or developed until its electric materials reach the planets and satellites. Doubtless a similar development of light and heat from the same central photosphere, or Leyden jar of our system, is also projected upon the body of the sun, beneath those two underlying envelopes; the intermediate penumbra and cloud stratum probably serving to screen the body of the sun from an excess of this contiguous store of electric light and heat, thereby maintaining a perpetually-softened daylight and equable heat over the whole habitable surface of the sun. Such data, derived from observed phenomena, as named, and rational deductions therefrom, probably give to our primary (the sun) characteristics more enjoyable for animal life than any conditions for such obtainable upon any of the planets or satellites; beside which, the greater dimensions of the body of the sun, exceeding that of all the planets and satellites combined, probably embodies a proportionately grander system of physical features than that of any of the planets, therefore embracing those additional charms for intellectual residents.

Charles E. Townsend.

Locust Valley, N. Y., April 20, 1863.

A Churn Power wanted.

Messrs. Editors:—Do you not know of some real practical and useful invention for saving the labor of churning, which, at the same time, will avoid the unpleasantness and inconveniences of the various machines moved by animal power, now in use? Perhaps there is no kind of work done about a farm that, in proportion to the results attained, requires so much time and hard labor as churning by hand, and this labor is often required on days when other duties are very pressing and laborious; as, for instance, washing days and baking days, when but little time or strength can be spared for it. To avoid this difficulty many resort to the use of machines propelled by dogs, calves or sheep. But oftentimes those animals cost more trouble than they are worth for such purposes. Their use in warm weather is very disagreeable, and not unfrequently cruel, and if we carefully estimate the expenses, the inconveniences and the unpleasantness attending their use, their utility for farmers generally must appear quite questionable. It seems to me, therefore, that if some person could invent a power that would relieve a weary care-worn housewife from the unpleasant necessity of imposing the task of a two hours' churning upon a tired husband as he returns from his day's labor, he would richly deserve to be styled a "public benefactor." J. B. Schooley.

Wyoming, Pa., April 13, 1863.

[Here is a chance for the energetic inventor to proceed forthwith. Who will invent the desired power? Who will reap the praise and pence of the overtaxed farmers' wives? We can testify fully to the unutility of calves for the duty, both biped and quadruped, and we think some other motor more desirable and efficient. Animals for churn-driving are hard to train, bad to catch when trained, and nearly useless after caught and trained, and with all these objections we think few will have the temerity to mention brute force in connection with the subject. Let us have some positive movement, gentlemen inventors, that will stand hard usage, and we doubt not, as our correspondent remarks, but that you will be rewarded. Some progress has been made in this line of invention, *vide* Scientific American during the last fifteen years.—Eds.]

It has been ascertained that, in China, black and green tea grow on the same bush; the difference in color and quality is attributed to the age of the leaf when picked.

A company has been formed in Chicopee, Mass., with a capital of $100,000, for the purpose of manufacturing leather goods and hardware.

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The Electric Light.

The following condensed extracts are from a lecture lately delivered by Professor Frankland, F.R.S., before the Royal Institution, London :—

"The electric light is produced by the interruption of an electric current flowing through good conductors. By this interruption the current is made to leap across a space provided for its passage in order to make its circuit. The limits of this space, in what we ordinarily term the electric light, are made by two portions of carbon or charcoal, in a peculiar form, capable of conducting the current with great facility. During the passage of the electric current across a space of this kind, the most intense heat is generated; and the two pieces of carbon, which are made the terminals, are heated to a degree far beyond that produced by any other means. The great source of illuminating power is obviously the ignited ends of the two pieces of gas-carbon, between which the electric current is passing. Such being the nature of the electric light, the first of the improvements which have been effected in it during the past ten years consists in the production of the electric current through the intervention of heat and mechanical force, by what is termed magneto-electricity. More than thirty years ago, Mr. Faraday produced a spark from the ordinary permanent magnet. The improvement constitutes one of the greatest steps in advance which has been made in the application and production of the electric light. By the combustion of coal a certain amount of mechanical power is obtained, which is applied to the rotation of masses of iron in the neighborhood of very powerful magnets. In this way currents of electricity are produced, and these are thrown together and made to circulate through a system of conductors, just as the electric light apparatus. There is no difference between the action of this electro-magnetic apparatus and the ordinary electric current produced by the chemical action which takes place in the voltaic battery. But this improved mode of producing the electric current demands less manual labor; in truth, the mechanical work is all performed by a steam engine, of greater or less power, which causes the rotation of these armatures. The electric current is thus obtained and is transmitted between carbon points. This mode of producing the electric light has been now in use for a couple of years or more in the South Foreland and Dungeness lighthouses, where it has performed its office without a single instance of failure; thus proving itself well adapted for the purposes of light-house illumination.

"For domestic illumination the light has not yet been brought into use; its expense, doubtless, at the present moment, being far too great to admit of its being employed in this way; but where a light of great intensity, regardless almost of the question of expense, is required, as in the case of lighthouses, this magneto-electric light can scarcely be too much prized.

"In addition to this improvement, we have also numerous methods for preserving the light more constant and steady than could be done during the first years of the application of this form of illumination. These improvements are of a purely mechanical nature. We have one example by which the carbon prisms are kept at a proper distance for the current to strike between them. Dubosc's arrangements are also much used; here a system of clock-work effects the same object; so that, as the carbon points wear away by oxidation, they are gradually made to approach one another; and thus the light remains constant. Another mode of effecting this has been devised by Mr. Way, who employs mercury as the material between which the electric current leaps across, in the place of carbon; and, in this way, he obtained a light which enabled him to dispense with a great deal of the complicated machinery necessary to render the electric light, as developed between prisms of carbon, as constant as could be desired.

We have here a lower vessel containing mercury, into which one of the wires of the battery dips. Allow a stream of mercury to run down into the cup placed below; and this stream will bridge over the space for the moment, and enable the electric current to pass over from one of these portions of mercury to the other, in order to complete the circuit. During this passage, the heat will convert the mercury into vapor, which will become incandescent, and give a powerful light. The flickering, which is the characteristic of this mode of illumination, is produced by the constant interruption of the current and of the light for a moment. It is painful to look at; and scarcely seems capable of replacing any of the forms of electric illumination, on account of this flickering, and because the light obtained from incandescent mercury vapor is very inferior to that obtained between pieces of carbon. Probably, the intensity of the former is not more than $\frac{1}{20}$th of the latter; so that there is not much chance of this mode of electric illumination coming into general use."

The Alpaca, Llama and Vicuna in California.

We learn from the *California Wine, Wool and Stock Journal*, that the United States sloop-of-war *Cyane* lately arrived at San Francisco with one male llama, a male alpaca, and two (male and female) vicunas. A female alpaca died on the voyage from Lima, S. A., to San Francisco, Cal. The object of bringing these animals to California is for the purpose of acclimating them. Commodore Bissell, of the *Cyane*, also brought several samples of the wool of such animals with him. These have been presented to the Wool Growers' Association, in San Francisco, and Mr. T. Rowlandson has read a paper on the subject before the California Academy of Science. The following interesting extracts are taken from it :—

"The llama has long been known to the students of natural history, as the earliest explorers of Peru have made mention of their docility, great powers of endurance under heavy burdens, and their ability to carry 125 pounds fifteen miles per day over mountains and rugged roads. They will live where mules will perish for want of food, and they will be very serviceable as carriers in developing the mineral resources of the numerous mines on the elevated sierras. The vicuna is known to Californians by the Peruvian hats made from its silken coat. The alpaca was but little known out of its native country until about thirty years ago, when a few bales of its wool were sent to Messrs. Joseph Hegan & Co., of Liverpool, England, who at once went largely into its importation, and being a firm of princely pecuniary means, the importation of alpaca wool immediately assumed a most important magnitude. Mr. Titus Salt was the first that devoted his exclusive attention to the perfection of its manufacture, some of which alone or mixed with silk, forms enduring and elegant dresses. The great market for this particular variety of fabric is South America, where the senoras and senoritas give a preference to it over all the species of silk or other silk mixtures for female clothing. Since the first introduction of alpaca wool for the manufacture of a textile fabric, a race has taken place between the producer and manufacturer, in which, from the gradually-increasing price of the raw article, it would appear that the manufacturer is gaining ground; this renders it, therefore, the more desirable that the raising of these animals should be vigorously set about. They are docile and produce fleeces of from 8 to 12 pounds each, worth, according to color and fineness, from seventy-five cents to one dollar per pound. The meat is said to be good, and the hide tans into a superior leather for harness purposes.

"According to the classification of the best naturalists, the alpaca, llama and their congeners belong more to the camel family than the goat or sheep; for although the hoofs of the South American animal are cloven, the same soft, pad-like character found in the Eastern camel is perceived on the hinder part of the hoofs of the South American variety, whilst the fore parts of the feet in the latter terminate in hard, talon-like curves, which are exceedingly useful to the llama species in climing abrupt rocky acclivities which a mule would not attempt, and where a goat would fail. In the resemblances between the camel and the llama tribe which have been enumerated, it has also been asserted that the digestive and masticatory organs have a considerable affinity to each other. They are very fond of the wild oats of California, and will probably thrive well in that State. They have already been acclimated in Australia and Scotland."

FLAX seed for sowing should be of the previous year's growth, and it should be plump, heavy, glossy, of a uniform size and a clear brown color. All seeds of a light drab color should be rejected.

A Laughable Lottery.

The prizes drawn at the Sanitary Gift Concert were partly distributed, yesterday, from the rooms, 54 Wells street, Chicago. The place was thronged from morning until night by young men and old, little girls, young damsels, old ladies—all ages, sexes and nationalities—Michigan-avenue brushing Kilgubbin, and Araminta jammed into the crowd with Biddy, the kitchen girl. The distribution was exceedingly ludicrous and afforded material for a volume of fun. A blushing young damsel from the country, evidently on her first visit to the great city, went home to gladden the rural hearth-stone with half a barrel of white fish. A prominent pork-packer drew a box of soap. A venerable old lady, with expectant eyes peering through her spectacles, handed in her ticket and went off with a bale of Killikinic tobacco. A Michigan-avenue heiress astonished her lady shopping friends by going down Lake street with a box of Havana cigars. A ragged little *gamin*, with a bundle of newspapers under his arm, drew a Greek lexicon. A prominent Sunday-school teacher was astonished to receive "The Adventures of Dick Turpin" and "The Female Pirate Captain, or the Scourge of the Atlantic." A bulky, jolly, spectacled grain-merchant got a bottle of "Hutchin's Diarrhea Exterminator." A highly-indignant feminine Milesian came in for a bundle of tracts. A homeopathic doctor went off with a bottle of the "Wizard Oil." A fireman on the *Little Giant* got "The Private Diary of a Devout Clergyman." And thus it went all day. The streets were filled with old bachelors, with perplexed countenances, carrying to their upper chambers boxes of pearl starch, and cream of tartar; young ladies with packages of bicarbonate of soda, cigars, and chewing tobacco; lawyers with nests of pails; staid deacons with the latest editions of yellow-covered blood and thunder; grain men with patent medicines, and newsboys with lexicons. It spoke eloquently of the infatuated worship at the shrine of Fortune. Her devotees are of all ranks and conditions, and in her presence the millionaire and the drayman, the snob, snob-ess and scullion, go down with their delicate or brawny knees into common dirt.—*Chicago Tribune.*

Peculiar Gunnery Experiments.

Some novel gunnery experiments were lately made at Shoeburyness, England. The first consisted of trials to ascertain how far a method now rather in favor among French artillerists, by which a series of holes, about an inch in diameter, are bored through the substance of the cannon near its muzzle, and permitting a quick escape of gas, to diminish its recoil, affects the service of the piece as to range and accuracy. The experiments were made with two brass 9-pounder ordinary smooth-bore field-pieces, loaded with the usual service charges and spherical shot. Five rounds were fired from each gun in succession. They were then shifted, so that each occupied the platform which had been used by the other, when again more rounds were fired. The general merits of the performances of each gun could be seen at a glance. The recoil of the ordinary gun was, in round numbers, just twice as great as that which had the holes bored round the muzzle, while the range and accuracy of the latter were scarcely more than half as good as that of the common piece. The lateral escape of gas and flame through the side holes of the French gun, was very great. One-half of the force of the explosion evidently escaped through the side holes before the force of the powder was expended on the shot, and virtually, therefore, the barrel of the gun is shortened by as much of its length as is thus perforated. As a general rule, the recoil of the gun is always in exact proportion to the force it exerts in propelling the shot, and anything which takes off from this recoil, by allowing the gas generated by the explosion to escape before it has done its work, just diminishes by so much the range, and, therefore, the accuracy of its fire.

FRESH discoveries are continually being made at Pompeii. In February the excavators brought to light the remains of a family group, consisting of a man, two women and a young girl. The bodies had decayed, but the hard mass around preserved their forms, and by pouring in plaster-of-paris an exact cast was procured, exhibiting the unhappy victims as they were struck down in their efforts to escape.

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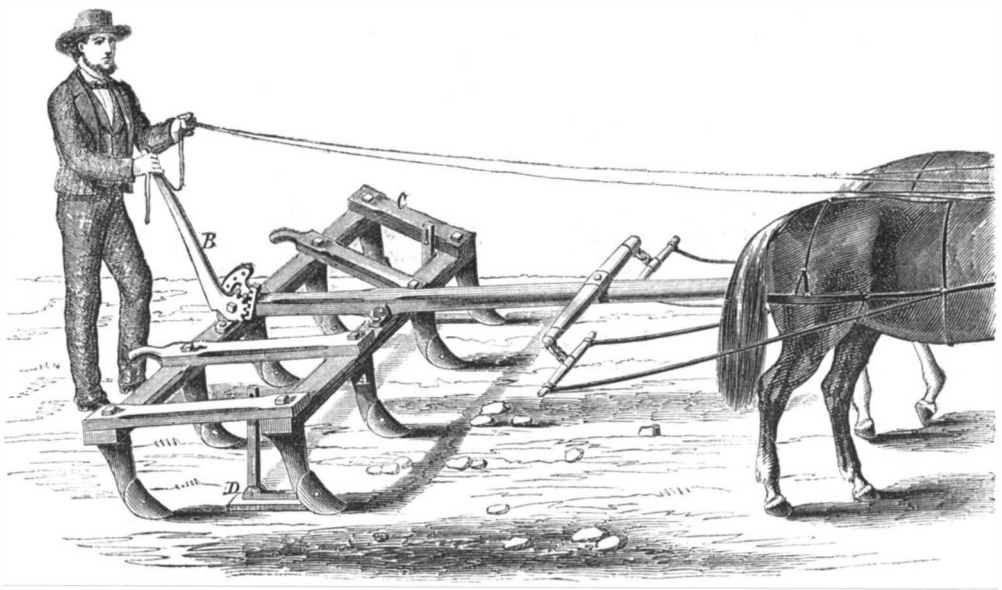
Improved Cultivator.

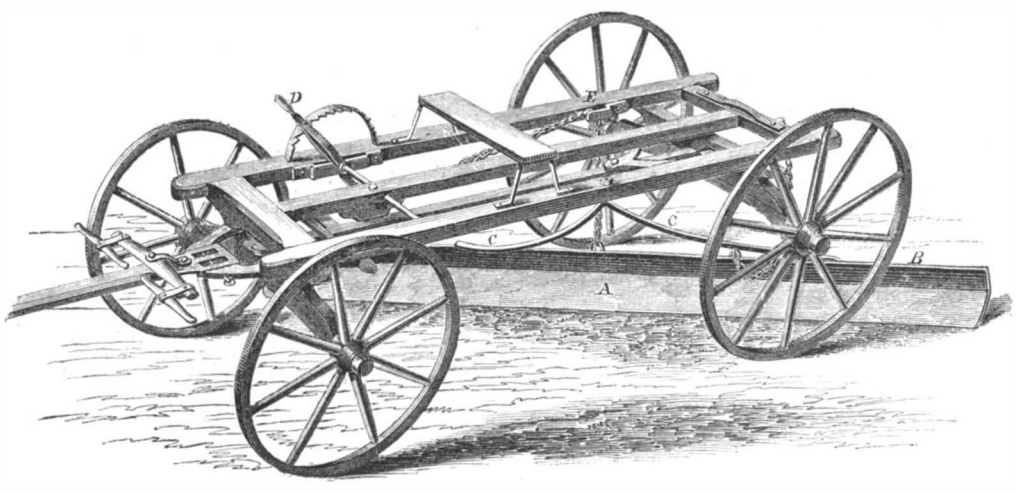
The object of this invention is to obtain a cheap cultivator, of light draft, that shall embrace all the good qualities of the common two-horse wheel cultivator; and at the same time be better adapted to the culture of orchards, vineyards, and hopyards, by dispensing with the wheels and regulating the depth to which the implements work from the bottom of the furrow. A tool is thus produced that can be drawn close to a tree or plant without injuring it. When the distance between the trees or plants is not sufficiently wide to admit of working two horses, the pole can be removed and a pair of thills inserted. When it is desired to have the teeth, A, penetrate to their greatest depth, the lever, B, is depressed; this causes the back part of the frame, C, to rise, consequently the shoe, D, is elevated from the bottom of the furrow, permitting the cultivators to penetrate the earth until the back teeth are brought on a level with the front ones, and the shoe again presses the bottom of the furrow plowed. Or if it is desirable to have the cultivator work near the surface, the lever is raised, thus throwing the back end of the frame down, making a fulcrum of the back end of the shoe, and causing the cultivator to be inclined upward, until it again finds its level. It then passes smoothly along and is not disturbed by small elevations or depressions in the surface of the earth. The patent for this invention was obtained through the Scientific American Patent Agency on June 10, 1862; further information respecting it can be obtained by addressing the inventor, P. S. Carhart, Collamer, N. Y.



CARHART'S PATENT CULTIVATOR.

Improved Grading Machine.

The roads in the country are the great highways of the people, and unless they are kept in good condition much loss ensues, both pecuniary and moral; for it is always a source of reproach to any community when they suffer their avenues of communication to fall into a disordered state. The machine herewith illustrated is designed to aid those engaged in the business and is also adapted to other purposes. It consists in the attachment, to an ordinary frame wagon, of the scraper, A. This scraper is made of iron, and is fastened to the wooden beam, B. This beam is connected with the wagon by a series of brace rods, C, in such a manner that, while they secure the scraper from detachment when at work, they also permit of an elasticity of movement which prevents it from being brought into contact with stones or obstructions of any kind. The forward part of the scraper has a plow end, not seen in this view, which permits it to enter easily into the loose earth to be removed, and the hight of the scraper is regulated by the lever, D, rack and chains working over the pulley, E, on the side of the wagon frame. This apparatus can be easily attached to any farm wagon, and we are assured by the inventor that it works admirably. The machine was patented, on March 3, 1863, through the Scientific American Patent Agency, by William Spalding, of Port Clinton, Ohio, from whom further information can be obtained.



SPALDING'S PATENT GRADING MACHINE.

THE CULTURE OF TOBACCO.

The following are some interesting and apparently practical instructions, condensed from the *Michigan Farmer*, as communicated by a cultivator of the weed:—He states that the latter end of April or early in May is the time for sowing the seed in the Northern and most of the Western States. Connecticut tobacco seed is best for Northern cultivation, and the sixteenth of an acre of ground devoted to its culture will supply the personal wants of any farmer who indulges in its use. The soil should be put into good tilth—plowed deep and rendered quite mellow. A light sandy soil or loam, well supplied with rolled stable manure, raises the finest tobacco. A strong-flavored tobacco is raised from what is called "a rich strong soil." A quantity of wood ashes mixed with the soil kills insects and promotes the growth of the plants.

First of all, a seed bed is made; and the seed for sowing is mixed with ten times its weight of fine earth and some wood ashes. The seed is then sprinkled evenly over the bed and it is not raked in, but simply beaten down gently with a spade. This seed bed should be in a sheltered position, and when the plants start they should be covered with a little straw every clear night until all signs of late frost have departed. When the plants are about five inches high they are fit for transplanting. A cloudy or rainy day is best for this operation. They should be set out about two feet apart each way—three feet is the Virginia rule. But, before the plants are set, a small quantity of rolled stable manure should be placed in the spots intended for each, and the earth drawn towards them to form small hills. The plants must be hoed as often as is necessary to keep down the weeds, and a sharp look-out must be kept for the "tobacco worm," which delights in committing ravages on this plant. This worm is about one and a half inches in length, and should be looked after every day.

When the plant begins to head it should be immediately cut back, so as to leave from six to ten leaves; suckers then begin to spring out at the junction of the leaf and stalk, these should be nipped off (some, however, let them grow until six inches long, then pick and dry them, thinking them more choice for various purposes than the larger leaves), as if allowed to exist they will take much from the full development of the main leaves.

Planting is done in May, hoeing and overlooking in June, July, August and September; cutting and housing in October; in the other months, pulling the leaves off the stalks. In the Southern plantations a man and woman are allowed three acres to manage. When ripe the stalk should be cut off near the ground. When tobacco is ready to cut up, it must be attended to, or it will spoil; especially if frost is expected there should be no time lost.

Tobacco of commerce is generally divided into three qualities. The lower leaves or those which touch the ground, are liable to get dirty and torn; but on the higher parts of the same stalk two different sorts of leaves are generally found, one yellowish and one brown. These should be carefully separated and put up in bunches somewhat thicker than a man's thumb and tied round with a thong made of the leaf itself. The bunches should be slung in pairs across poles and put in the drying-house. Too much heat will spoil the whole crop. More depends upon proper drying than any other part to determine its market value. The heat of the drying-house should be moderate and the drying should be slowly conducted. The very finest qualities of leaf tobacco will be destroyed if they are subjected to a high heat in the drying-room.

MAPLE SUGAR.

When cane sugars obtained such extraordinary prices in the market we fondly hoped that the mildness of the season, the increased advantages in the shape of evaporating pans and other appliances in the way of manufacturing, together with the attention and importance which was given to the subject by the press generally, would have resulted in bringing the article to market in such quantities as to compete with foreign sugars. Our anticipations in this respect have been disappointed, and though it is now the hight of the sugar season, we have only observed very small lots, held chiefly as confectionary, and sold at the *moderate* rate of thirty cents a pound. We do not know whether the article is catalogued in the Internal Revenue bill as sugar or confectionary; if the latter, there is a large difference in the amount accruing to the Government between it as an article of luxury or one of necessity; and those charged with the execution of the laws would do well to consider the matter. Maple sugar at thirty cents a pound will hardly compete with Havana sugar or be considered as indispensable by a majority of the people. Perhaps the trees themselves afford less sap than formerly—on account of the war. Is it so?

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NEW YORK, SATURDAY, MAY 2, 1863.

IRON-CLAD SHIPS AGAINST FORTS AND HEAVY ORDNANCE.

The recent naval engagement in Charleston harbor has not been without beneficial results of a practical nature. On that occasion nine devoted vessels assailed a granite fortress of immense strength, and were beaten off and compelled to retire from before it by sheer force alone. The vessels were iron-clad, and with one exception were supposed to embody all the latest improvements; the exception was the *Keokuk*, in which no one except the inventor thereof seemed to have much confidence. The Ericsson batteries, built on the *Monitor* principle and supposed to be invulnerable, were temporarily disabled and compelled to retire. There is no question of inability or mismanagement involved in this disaster; it was simply inevitable under the circumstances, and from reading the graphic reports of reliable persons in the daily papers we are compelled to assume that, with their present armor, iron-clad ships are no match for the heaviest artillery. On page 265, current volume of the SCIENTIFIC AMERICAN, in an article on national defenses, we said that our present forts were rendered of very little use by the adoption of iron-clads, and this is literally true, as heretofore all experience has shown that mailed vessels have successfully defied them. In the attack upon Charleston we may doubt whether the repulse which we received would have taken place had the channel been unobstructed and the vessels left free to run by the forts—at their peril of course.

The failure of the Ericsson batteries to accomplish what was expected of them has created much disappointment in the public mind, which is always ignorant of technical points and mechanical details and not qualified to judge in such cases. The *Monitors* in action were all disabled, more or less, and their weak points, as now constructed, are many; as, for instance, the turrets, the pilot-houses, and the main decks. The projectiles fired by the rebels were of the heaviest and most destructive kind, and we may well infer that the charges of powder which propelled them were not stinted in quantity. From conversations we have had with intelligent mechanics from near the point of attack, who have seen these vessels since their engagement, we can assert that they are not nearly as much damaged as has been represented, and that the most serious disasters were repaired in a few hours after the retreat. We see no reason for any discouragement or for depreciating the powers of those wonderful batteries. The inventor of these batteries recently stated through the daily press that the thickness of the turrets could be augmented as much as desired, without inconvenience to the stability of the ship, and that the other parts, the pilot-houses, &c., can be further protected to any reasonable extent. This is limitedly correct in the case of the batteries now afloat, and the public will remember that the original *Monitor* was materially strengthened by additional plates on the turret, after her fight with the *Merrimac*. The *Dictator* and *Puritan* are to have turrets 21 inches thick, it is said, or just 10 inches more than the turrets on the *Monitors*, and there is no question that if these formidable vessels were launched and equipped, as they shortly will be, they might successfully dare the passage of all the "Sumters" in the world. The other details of these batteries, such as the starting out of the fastening bolts through the turrets and pilot-houses, ought to have been foreseen and provided for before. The same misadventure occurred on the first *Monitor*, if our memory serves us; when these matters are properly disposed of, the efficiency of the crew within will be greatly enhanced. We do not regard the failure of the batteries to perform the work as inherent and ineradicable defects in the plans themselves, but rather that the inauguration of any new mode of warfare which revolutionizes the whole art of systemized attack, must necessarily take place by slow but certain stages. We cannot expect to attain proficiency by a single leap; even the mighty Achilles had his vulnerable heel, and our modern mailed warriors, though assailable in some parts of their ferruginous coating, will yet be rendered shot and shell proof. One fact should not be overlooked, however, and that is the reliance implicitly placed upon light angulated armor as a means of deflecting shot. The Whitney battery (*Keokuk*) constructed on this principle, went to the bottom soon after being riddled, and a very few minutes served to illustrate the unfitness of such armor for defensive purposes. All vessels with inclined armor are supposed to be so constructed that the shot will glance from them without doing any damage. If we conclude, for the purpose of argument, that the enemy will fire a round shot at a very low velocity, on a line with the horizon, then the assumption may be correct. The fact of the matter is, however, that inclined sides simply present, to barbette guns, the fairest target they could desire, and the supposed efficiency of the angle is utterly neutralized. The *Galena* at Drury's Bluff and other gunboats on the Western rivers have been repeatedly pierced by guns fired from elevations. Inclining the armor simply increases the thickness of the plating to be pierced when the shot is fired on a line with the horizon. A plunging fire is received by inclined plating fair and square, and there are no instances on record where acutely-inclined armor has resisted the impact of the heaviest rifled shot at a fair range. The Parrott 300-pounder is said to have pierced nine inches of iron inclined at an angle of 45°, and the Stafford projectile is known to have penetrated seven one-inch plates, heavily backed up with timber, at the same inclination. Inclined sides, with inadequate armor, are simply a delusion and a snare. The *Ironsides* is said to have been the least injured of the vessels; this is a little remarkable in view of the other facts connected with the bombardment, but we have no comments to make.

[Since the above was written we have received some very interesting details of the *Ironsides*' part in the engagement, which will be found on page 276.]

Several persons are quite certain that they saw a number of large holes in the walls of Fort Sumter; but as this seems to be mere assumption, there is nothing to be said until the future shall reveal the actual extent of the damage done to the fort, and we are also ignorant of any of the practical working of our large guns.

THE BOILING OF WATER AND STEAM-BOILER EXPLOSIONS.

On page 278, current volume of the SCIENTIFIC AMERICAN, will be found a communication on the above subject, from the pen of Mr. A. Guthrie, of Chicago. We have appreciated and supported his labors in reforming our general laws for the prevention of explosions in the boilers of steamboats; and we rejoice in the fact, that where explosions were once common on our Western waters, steamboat traveling has become comparatively safe. He states in his communication that nine out of every ten steam-boiler explosions are caused by the water becoming too low in the boilers. Probably he is correct with respect to steamboats; we do not question his statement. But he also states that some explosions take place from other causes, which he defines; and yet his letter was written chiefly to protest that no explosions do or can take place from another cause, namely, water in the boiler, being perfectly freed from atmospheric air, exploding when subjected to heat under certain conditions. His statements on this point exhibit a too hasty examination and consideration of the question. It never has been asserted that this was the one cause of steam-boiler explosions; and it never has been set up as a theory of the cause of explosions in general. It has simply been asserted that water entirely deprived of atmospheric air, subjected to heat under certain conditions, can be heated above 212° without boiling, and will explode violently. A few explosions which have appeared to be mysterious have been attributed to this cause. Now is it a fact, or not, respecting water exploding under such circumstances? If it is a fact, and if but a single boiler in the whole history of steam engineering has exploded from such a cause, every engineer should know it, and it is our duty as far as we can to inform all engineers, because it will tend to increase their watchfulness in performing their tasks. Even if it were a doubtful statement, we cannot see how our correspondent has come to the conclusion that the article to which he refers has "a direct tendency to mislead engineers" and "will be productive of the worst consequences." Mr. Guthrie has made a disparaging allusion to Prof. Donney; but in all the latest works on chemistry, it is admitted as a fact, that water deprived of atmospheric air may be exploded according to the discovery attributed to him. We quoted the statements of Prof. Miller on this subject on page 201, current volume of the SCIENTIFIC AMERICAN, and we will now quote from the very latest published work on chemistry to the same effect. On page 126 of Proffessors Brande & Taylor's "Chemistry" (issued last week by Blanchard & Lea, of Philadelphia) it says:—

"Water gives off a vapor at all temperatures, even at 32°. In its ordinary state, if exposed to heat in open vessels, it boils or is converted at 212° into steam, the barometer being at 30 inches. But the boiling point of water varies with the pressure, and is influenced by the air which the water contains, as well as by the vessel in which it is heated. When quite pure and deprived of air, water may be heated to about 240° before it reaches the boiling point; at this temperature, however, it is suddenly converted into vapor with explosive violence. If a piece of pure ice be heated in a vessel containing oil, the heat may be continued until the water from the ice has reached a temperature of 240° when the whole is converted into vapor with explosion. The tranquil ebullition of ordinary water at 212° appears, therefore, to be mainly dependent upon the presence of air."

Men of science must accept facts whether they suit preconceived theories or not. Is the above extract a fact or fiction? If the former, Mr. Guthrie has placed himself in opposition to scientific progress; if the latter, the very ablest chemists living are laboring under a delusion on this subject. The general cause of boiler explosions is an over-pressure of steam in proportion to the strength of the boilers. A boiler may be defective in form, in its metal, and in its general construction before it is used. While in use, its plates may have become corroded, its safety valve may be too heavily loaded, or it may be short of water. In any of these cases, an explosion may occur. We believe that most explosions are occasioned by an excess of steam-pressure not much above the ordinary working pressure; and an over-pressure of steam may be gradually or suddenly accumulated. These have been the views inculcated in our columns, and we have endeavored to present not only the most accurate information on this, as on other subjects, but the fullest knowledge possible.

TAPPING HOLES.

It is a fact, no less remarkable than true, that too little attention is given, in some machine-shops, to the importance of tapping holes correctly and properly. Not only are the holes drilled too large, but the tap is allowed to take its own course, and if the bolt which is to follow in the threaded hole works as it should, it will be more on account of good luck than proper management. It was only the other day that we saw a workman upon an iron-clad, tugging away at a one-handed wrench and endeavoring to turn a tap that was beyond his strength. The tool was working badly and he was doing much more harm than benefit to the job, and we could not but reflect how much it might cost to repair a piece of recklessness which should never have occurred.

The consequences of abusing taps might be enlarged upon at great length, but we forbear and content ourselves with simply remonstrating against threading holes out of all truth when they should be per-

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fectly square—against drilling three-sided holes for a tap bolt—against drilling holes so small that the tap must be driven in with a hammer before it will "take"—against tapping holes in castings as they come from the foundry, full of scale (this we have repeatedly seen done)—and against the whole array of misuses to which these costly appurtenances of a machine-shop are subjected. It takes time to make a tap, and as a great deal depends upon having them in good condition, more attention should be given to the proper use of them.

GEOLOGY AND THE "KING CRAB."

"Visitors to the Aquarium House at the Zoological Gardens have no doubt noticed the living specimens of that curious creature, the 'king crab,' which are now in a tank alive and well. The most curious part of their structure is the eyes; they have four, which are composed of numerous lenses, like the dragon-fly or bee, and are so arranged that they can see objects on each side of them. Besides being interesting simply as living creatures, king crabs are the nearest existing relations to the ancient form of beasts called 'trilobites.'"—*The London Field.*

The king crab is what is commonly known here as the "horse-shoe." Such creatures are taken by thousands annually on the marshy coasts of New Jersey and Long Island, and are used extensively for manuring the land. No living specimens are now found in England, but their fossils are not uncommon. The past geologic age of Europe is similar in many of its features to the present in the New England States. Hugh Miller in his lecture on geology says: "America though emphatically the *New* World in relation to its discovery by civilized man, is at least in these regions an *old* world in relation to geological type; and it is the so-called *Old* World that is in reality the *new* one." Professor Agassiz says: "If we compare a list of the fossil trees and shrubs from the tertiary beds of Œningen with a catalogue of the trees and shrubs of Europe and North America it will be seen that the differences scarcely go beyond those shown by the different floras of those continents under the same latitudes. But what is quite extraordinary and unexpected is the fact that the European fossil plants of that locality more closely resemble the trees and shrubs which grow at present in the Eastern parts of North America than those of any other part of the world. The present Eastern American flora and fauna have a more ancient character than those of Europe. The plants, especially the trees and shrubs growing in our days in the United States, are as it were, old-fashioned." On this topic Hugh Miller again says: "Towards the close of the miocene period old Scotland exhibited features greatly resembling those presented to the Puritan fathers by the forest-covered shores of New England, little more than two centuries ago.

The Launch of the "Re d' Italia."

The powerful steam ram frigate, *Re d' Italia*, built by William H. Webb, Esq., for the Italian Government, was launched from the constructor's yard, at the foot of Sixth street, East River, at 5 minutes before 10 o'clock, on the morning of the 18th ult. The frigate is 280 feet in length, and has 58 feet beam. The sides of the vessel will be covered with 4½-inch iron plates; these, we believe, are to be made in France, and the combined thickness of the ship's sides, including all, will be 38½ inches; the backing is of wood. The frigate will be about 7,000 tuns burthen; she is to be propelled by two horizontal back-acting engines, having cylinders 84 inches in diameter by 45 inches stroke; furnished with surface condensers and all the modern improvements. The screw propeller is a massive brass casting and weighs nearly 30,000 pounds. It is a two-bladed, expanding-pitch screw, and will be fitted with patent hoisting gear, so arranged as to be hoisted out when under sail alone. All the work done upon the vessel, so far, is of the most substantial description, and will conduce greatly toward sustaining the builder's reputation abroad.

A large number of ladies and gentlemen were present on the occasion of the launch, which passed off very handsomely, and Mr. Webb may congratulate himself, under the circumstances, that Fortune favored all his efforts to attain success.

CAUSES OF THE PHENOMENA IN ORGANIC NATURE.—THE ORIGIN OF SPECIES.

Of late years men of science and others have wrangled much over Mr. Darwin's work on "The Origin of Species." In most of the English and American reviews his treatise has been severely criticized, as having an infidel tendency; not on account of the facts therein given, but the conclusions of the author. He appears to have been very generally misunderstood, judging from a most interesting little work just issued by D. Appleton & Co., this city, being the publication of six lectures delivered to working men, by Thomas H. Huxley, F. R. S., Proffessor of Natural History in the School of Mines, London. Broadly stated, the subject of these lectures consists of an inquiry into the origin of species and a discussion on the causes of the phenomena in organic nature.

The meaning of organic nature is something that grows, has life and reproductive powers. It is exemplified in the seed of a plant in contradistinction to a grain of sand. Organic nature embraces the vegetable and animal kingdom, as entirely distinct in functions from rocks, fluids, and what chemists call "elementary matter." Animals and plants are divided by naturalists into groups, and these into kingdoms, sub-kingdoms, provinces, classes, orders, families, genera, and species. It was once very generally believed (and many persons entertain such views still) that there was such a thing as spontaneous generation—that is, mere elementary matter, such as pure water or mineral dust exposed in favorable positions, to light and heat, would bring forth vegetation and animalcula spontaneously. Hence it has been asserted that, if there is such phenomena as the spontaneous generation of life, according to the "development theory" of some naturalists and the views of Mr. Darwin on the origin of species, man may have been developed from the lowest forms of spontaneous generation. If such views were founded on facts in natural history, pantheism, viz., that "God is nature and nature is God," would be supported upon a very firm foundation.

Mr. Darwin does not discuss the question of spontaneous generation at all, and science completely silences pantheism. Every organism commences existance in an egg-cell or seed, and each seed is believed to have been specially created, with special functions and powers of reproduction, as stated in the Scriptures. M. Pasteur, a distinguished French chemist, has lately made a great number of carefully conducted experiments to test the theory of spontaneous generation. The results of his labors seem to be conclusive against the theory; no such property as spontaneous creation belongs to elementary matter acted upon by the forces of nature. An old and bitterly disputed question thus appears now to be settled scientifically.

Another question of much dispute seems to be settled by Mr. Darwin; thus the Caucasian, the Malay, and the Negro, according to his facts, are varieties of species, and may all have descended from a single pair, as set forth in the Scriptures. On the other hand, Prof. Agassiz and others believe they have descended from different original pairs, and thus they would really be different orders. In 1793, a new variety of sheep was produced by Seth Wright of Massachusetts. He had a flock, the members of which were specially gifted with the power of jumping fences, and thus tormenting the proprietor and his neighbors. In one accidental buck lamb, which had very short bowed legs, the acute mind of Seth Wright saw a remedy for his troublesome fence-jumpers, and by careful breeding he at last obtained an entire flock of long-bodied short-legged sheep, called the "otter breed," from this single buck which could not jump a foot-rail. Various species of dogs, hogs, and pigeons have been produced in the same manner. In structure they are different from others of the same genus, but psycologically they are identical. There is a well defined limit to organic varieties in animals. Two entirely different races may mix; but their progeny, as in the case of mules, become sterile. Proffessor Huxley states that there are no reliable exceptions to this law.

The rapid powers of production in plants from a single specimen, is set forth by Prof. Huxley as follows:—"Suppose the habitable part of the globe to be 51,000,000 square miles, and the climate and soil equal over that space, it may be entirely covered in nine years from the product of a single plant bearing fifty seeds, each plant requiring one square foot of soil for support." It is hardly conceivable that the whole stated available surface of the earth could be stocked in about nine years from a single plant, yet the figures demonstrate such a possibility.

VALUABLE RECEIPTS.

Bronzing Metals.—The production of different colors on the surface of metals, such as works of fine art, &c., is called bronzing. Mere surface-coloring is executed with metallic powders mixed and applied with a varnish. But the most perfect bronzing is produced by chemical action on the metal itself—its own surface being thus made to form the bronze color. Dr. Ure says, respecting this art:—"Coins and metals may be handsomely bronzed as follows:—2 parts of verdigris and 1 part of sal-ammoniac are to be dissolved in vinegar; the solution is to be boiled, skimmed and diluted with water till it has only a weak metallic taste, and upon further dilution lets fall no white precipitate. This solution is now made to boil briskly and is poured upon the objects to be bronzed. These objects must have been previously cleaned and made perfectly free from grease and set in a copper pan. This pan, with the articles now in it, is put on a fire and the solution made to boil for some time. The articles, if made of copper, will acquire an agreeable reddish-brown hue without losing their luster; but if they are boiled too long, the coat of oxide upon them becomes too thick and looks scaly and dull; and if the solution is too strong, the copper becomes covered with a white powder which becomes green on exposure to the air. The pieces thus bronzed must be washed well in warm soft water and then carefully dried, or they will turn green. The antique appearance is given with a solution of three-quarters of an ounce of sal-ammoniac and a drachm and a half of binoxalate of potash (salt of sorrel) dissolved in a quart of vinegar. It is applied with a soft rag to the surface of the metal, then allowed to dry. Several applications are thus made until a coating of sufficient thickness is obtained. Copper acquires a brown color by rubbing it with a solution of the common liver of sulphur or sulphuret of potash."

The Chinese are said to bronze their copper vessels by taking 2 ounces of verdigris, 2 ounces of cinnamon, 5 ounces of sal-ammoniac and 5 ounces of alum, all in powder, making these into a paste with vinegar and spreading it upon the surface of the article, which should be previously brightened. The article is then held over a fire till it become uniformly heated, then it is cooled, washed and dried. It thus receives one, two or several of such coats until the desired color is obtained. An addition of sulphate of copper to the mixture makes the color chestnut-brown.

A good method of bronzing copper articles, such as tea urns, to prevent them tarnishing, is described in most all the best treatises on chemistry. It is as follows:—The copper is first cleaned, then brushed over with peroxide of iron (generally colcothar) made into a paste with water or with a dilute solution of the acetate of copper. The article is then placed in a muffle in a furnace and heated cautiously for some time, then taken out and cooled. Upon brushing off the oxide the surface underneath is found to have acquired the desired hue.

Another method of bronzing copper is to brush it over with a paste of black lead, place it over a clear fire till moderately heated, then brush it off. A very beautiful bronze is thus produced. The surface of the copper must be perfectly bright when the black lead is applied. A thin film of wax or tallow applied to copper and the article placed on a clear fire until the wax or grease begins to smoke, produces a bronzed surface. In all these operations great care is necessary in managing the articles properly when subjecting them to the action of heat.

The following is a receipt which we have been told will produce a beautiful dark bronze on brass:—To 1 pound of muriatic acid add 6 ounces of the peroxide of iron and 3 ounces of yellow arsenic; mix these together and let the solution stand for about two days, shaking it occasionally. The brass article, perfectly

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free from dirt and grease, is now to be immersed in it and allowed to stand for about three hours, when it turns perfectly black. It is then lifted out and washed well in soft water and dried in sawdust. After this it is coated with a paste of black lead used for iron stoves, and when dry it is polished with a brush. After this it may receive a thin coat of lac-varnish.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Machine for Printing Designs on Textile Fabrics.—This invention consists in imparting to the material to be printed a lateral vibrating motion, during the operation of printing, in such a manner that the printed surface assumes a watered appearance of different patterns according to the rapidity of the vibrating motion when compared with the rotary motion of the printing and pressing rollers ; it consists further in the combination with the printing and pressing rollers of a vibrating roller, the lateral motion of which can be regulated by means of cranks, pattern or eccentric wheels or any other suitable device, in such a manner that the vibratory motion of the cloth or other material passing over said roller to and between the printing rollers can be regulated according to the desired pattern ; it consists, finally, in the arrangement of two hinged angular levers in combination with the let-off roller, from which the fabric to be printed unwinds, and with a weighted roller, in such a manner that the pressure exerted by the weighted roller on the gudgeons of the let-off roller regulates itself according to the varying diameter of said roller and consequent increase or decrease in the power required for turning the same, and that by these means a perfectly uniform tension of the fabric, during the operation of printing, is effected. Edward Leitenberger, of Reichstadt, Kingdom of Bohemia, is the inventor of this device, but further information about it may be had by addressing the assignee, A. G. Scheller, 370 Bowery, New York.

Coloring Photographic Pictures.—The object of this invention is to enable photographic pictures on albumenized paper to be successfully colored with dry colors. Such pictures, owing to the albumenized paper not being capable of receiving dry colors without some preparation, and no perfectly suitable preparation having been heretofore known, are commonly colored with water colors, and this can only be done successfully by skillful artists so as to bear the close inspection to which such pictures are subject. This invention consists in the use of collodion as a medium for receiving dry colors on such pictures. James F. Bodtker, of Madison, Wis., is the inventor of this improvement.

Direct-acting Engine.—The object of this invention is to arrange the main valve of a steam cylinder in such a manner that the steam is changed and a full head of steam admitted as soon as the piston arrives at the end of its stroke, and that the engine will pass the dead points without the aid of a balance wheel. The invention consists in the employment, in combination with the ordinary slide valve, of a secondary steam cylinder provided with a slide valve in such a way that by the action of said secondary cylinder the main valve is suddenly thrown from one end of the steam chest to the other, before the piston of the main cylinder arrives at the end of its stroke, and that by these means the steam is changed and a full head of steam admitted to reverse the motion of the piston without the aid of a balance wheel. The motion of the slide valve of the secondary cylinder is governed by the action of cams and by the motion of the secondary cylinder. Louis Winterbauer, of New York City, is the inventor of this engine.

Railroad Car Brake.—The object of this invention is to obtain a car brake by which all the brakes of a series of cars comprising a train may be operated simultaneously by the engineer, and the brakes made to act with an equal or uniform pressure on all the wheels of the several cars ; the invention, at the same time, admitting of a brakesman applying the brakes at either end of a train after the locomotive is detached. Joseph Hough, of Buckingham, Pa , is the inventor of this improvement.

Revolving Fire-arm.—The principal object of this invention is to provide for the loading of a revolving fire-arm with metallic cartridges carrying their own priming in hollow flanges projecting circumferentially around their rear ends without having the revolving cylinder of the arm open at its rear end ; and hence it consists in the construction of a revolving fire-arm with a number of independent movable chambers fitted to slide longitudinally within openings in the sides of the revolving cylinder ; it also consists in the employment, in combination with such a system of movable chambers, of a stationary piston secured to the frame of the arm for the purpose of expelling the discharged cartridge shells from the said chambers by a forward movement of the chambers from the cylinder. F. P. Slocum, of Brooklyn, N. Y., is the inventor of this fire-arm.

SECONDARY GOVERNMENT FEES ON PATENTS.

We would call the attention of patentees to the annexed amendment of the Patent Laws, enacted March 3, 1863 :—

Every patent shall be dated as of a day not later than six months after the time at which it was passed and allowed, and *notice thereof sent to the applicant or his agent;* and if the final fee for such patent be not paid within the said six months, the patent shall be withheld, and the invention therein described shall become public property as against the applicant therefor : Provided, that in all cases where patents have been allowed previous to the passage of this act, the said six months shall be reckoned from the date of such passage.

From the above it will be seen that it is incumbent on every patentee to pay the *second* Government fee within six months after a patent is allowed, or else it will become public property and the inventor will be deprived of the patent.

THE BIBLIOTHECA SACRA. Published by Warren F. Draper, Andover, Mass.

This theological review for April contains nine essays on different subjects, viz: "The Roman Empire and Christianity;" "Buckle's History of Civilization;" "The Old School in New England Theology," &c. *The Bibliotheca Sacra* is very cosmopolitan in an evangelical sense, and is exceedingly candid in controversy. Its essays are not dry "marrowless treatises," like those of the old schoolmen, nor are they flippant, like those of too many modern writers on such topics, but they are usually brilliant, acute and learned.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides, covered with marble paper and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we shall commence on the expiration of this present volume to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style will be 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, 37 Park Row, New York.

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PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known and inclosing $1 as fee for copying. We can also furnish a sketc any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the Government fee.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING APRIL 14, 1863.

Reported Officially for the Scientific American.

*** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

38,130.—Metallic Hoop.—J. L. Alberger, Buffalo, N. Y.:
I claim a hoop for barrels, casks, tierces or other vessels made of staves, having one or more corrugations or creases in it, for the purpose herein described.

38,140.—Manufacture of Steel.—Charles Attwood, Ton law Iron-works, Durham county, England. Patented in England May 15, 1862 :
I claim the production or manufacture of steel and iron of a steely quality, substantially as hereinbefore described and set forth.

38,141.—Screw.—J. A. Ayres, Hartford, Conn. :
I claim a screw, A, with a dovetailed slot, a, as and for the purpose set forth.

[This invention consists in the arrangement of a dovetailed slot in the head of a screw, in such a manner that the edges of said slot afford a good and firm hold to the screwdriver, and that said slot is not liable to wear out and cause the screwdriver to slip]

38,142.—Provision-cooler.—J. W. Bartlett, New York City :
I claim a cooler or refrigerator consisting of the provision chamber, J J, air and water chamber, S S, ice box, H, hollow tubes, O O, when arranged substantially as and for the purposes specified.

38,143.—Station and Street Indicator for Railroad Cars. Alexander Bertier, Hannibal, Mo. :
I claim the endless band with a star or pointed wheel attached to one of its rollers or the shaft thereof, and a projection at the side of the track or road to actuate said wheel, in combination with a bell, combined spring-hammer and stop, and the pins or rods, b, the latter being attached to the roller aforesaid, and all arranged to operate substantially as and for the purpose herein set forth.

I further claim the weight, I, applied to one of the rollers of the endless band, when used in combination with the other parts of the band-moving mechanism, for the purpose specified.

[This invention consists in the employment or use of an endless band having the names of the stations or streets marked upon it and placed within a suitable case inside the car, in combination with a bell, a combined bell-hammer and stop, and a band moving mechanism, whereby the several stations or streets will be indicated, as they are reached, to the passengers in the car, and an alarm sounded so as to direct the attention of the passengers to the indicator.]

38,144.—Coloring Photographs.—J. F. Bodtker, Madison, Wis. :
I claim the use of collodion as a medium for receiving dry colors on photographic pictures on albumenized grounds, substantially as herein described.

38,145.—Churn Dasher.—A. C. Brown, Sycamore, Ill. :
I claim the churn dash, constructed and operating substantially as and for the purposes set forth.

38,146.—Carbon Plate for Galvanic Batteries.—C. T. Chester, New York City :
I claim, in combination with a carbon element of a galvanic battery, a gold or platinum connection imbedded in the carbon during the process of manufacture of the carbon element, substantially as described.

38,147.—Cork-drawer.—Chas. Chinnock, Brooklyn, N.Y.:
I claim the combination of the ratchet cap, a, the loose snail-like cam or screw, b, and the corresponding cam or screw, c, with the independent worm and pillar, d, all operating together for the purpose set forth.

38,148.—Chuck for Lathes.—J. Christman and Wm. Gillfillan, Syracuse, N. Y. :
We claim a chuck, constructed, arranged and operated as described, that is to say, having the sliding pins or dogs, L, working in the radial dovetail grooves, in the outer casement wheel, in combination with projections, O, working in the eccentric grooves in the face of the inner wheel or disk, J, when said wheel or disk, J, is operated by means of the tangential screw, H, the several parts being constructed, arranged and operated in the manner described, for the purpose specified.

38,149.—Lamp.—G. F. J. Colburn, Newark, N. J. :
I claim the reservoir, A, having the arms or projections, a and b, so formed and combined with it, as to support and supply with oil more than one burner, simultaneously, as specified.

I claim the application of the cap between the burners for the object specified.

38,150.—Lamp Chimney.—G. F. J. Colburn, Newark, N. J.:
I claim the method of connecting a tube with a lamp or gas burner by means of a fixture made and attached as described, so that it may be combined with or removed from a glass globe or other transparent device protecting the flame, substantially in the manner and for the purpose specified.

38,151.—Mast for Navigable Vessels.—Cowper P. Coles, Southsea, England. Patented in England, April 10, 1862 :
I claim the construction of masts for vessels of tubes of steel or iron, in the manner and for the purposes substantially as set forth herein.

38,152.—Evaporating Pan for Sugar Juices.—D. M. Cook, Mansfield, Ohio :
I claim, first, The arrangement of a zig-zag steam coil, constructed substantially as described, within the ledges of an evaporator pan which allows the juice to flow continuously in an indirect course, arrests the impurities and also keeps the juice comparatively cool outside of the steam coil, substantially as and for the purposes described.

Second, The combination of the steam coil metal bottom, partitions, wooden ends and wooden bottom, in the manner and for the purpose described.

Third, The manner of suspending the coil.

38,153.—Cylinder Polisher.—George Cowing, Seneca Falls, N. Y. :
I claim a cylinder polisher composed of the stem, D, springs, A A, and rubbers, B, constructed substantially as set forth.

38,154.—Steam Radiators.—R. T. Crane, Chicago, Ill. :
I claim, first, Constructing the base, A, of a steam radiator of two or more chambers, and connecting the said chambers by the vertical U-shaped pipes, B, when arranged and operating substantially as and for the purposes delineated and set forth.

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Second, I claim the opening, C, between the compartments of the base of the steam radiator for the purposes herein described and set forth.

Third, I claim the opening, c, or its equivalent, for the purposes shown and specified herein.

38,155.—Holding-frame for Corkscrews.—H. M. Creamer, Brooklyn, N. Y.:

I claim a corkscrew holder having the capacity, substantially as described, of being varied in width to suit different-sized bottles, substantially as specified.

Also a holder having the capacity, substantially as herein described, of being varied in length to suit various lengths of corkscrews, as set forth.

Also the mode, substantially as specified, of holding the cork when withdrawn, while being freed from the corkscrew, consisting in the use of a series of points arranged and employed in combination with the holder, substantially as described.

38,156.—Composition for lubricating Wool.—B. A. Earl, Philadelphia, Pa.:

I claim the use of borax water for purposes of lubrication in the manufacture of wool, as above specified.

38,157.—Pump.—E. Elliott, Petaluma, Cal.:

I claim the forming of the induction and eduction tubes, A B, of a series of wooden pieces, a, bored longitudinally and connected together, substantially as shown, in combination with the pump cylinder, D, attached to one of said pieces, a, and communicating with the tubes, A B, as shown and provided with the piston, F, all arranged to operate as described, the above parts being used with or without the air vessel, C.

This invention relates to a new and improved force pump of that class which are placed at the bottoms of wells. The object of the invention is to obtain a simple and efficient pump of the class specified, and one which will be capable of being advantageously applied to a windmill to be worked or operated thereby.]

38,158.—Device for Operating Churns.—Geo. C. Ferris, Sharon, Wis.:

I claim the combination and arrangement of the dasher handle, e, the lever, E, the wheel, B, the hole, o, and the support and guide, D, constructed and operating substantially as and for the purposes set forth and described.

38,159.—Railroad Chair.—B. F. Gossin, Cincinnati, Ohio:

I claim, first, The adaptation of the base plate, C, side plates, B, bolts, b′ b′, and rails, A A, for use together in such manner that the base plate, C, is supported and confined against lateral, longitudinal and vertical movement, in the manner substantially as described.

Second, The combination of the side plates, B b b, through bolts, b′ b′ c c, and plate, C, with the rails, A A, in the manner substantially as described.

Third, The side plates, B b b, constructed as described, for the purpose set forth.

Fourth, The arrangement at the ends of the plate, C, of the key bolts, b′ b′, in the manner and for the purpose described.

Fifth, Preventing lateral play of the base plate, C, by means of the jaws, b b, which underhang the plate, C, in the manner described.

38,160.—Paper Shirt Collars.—S. S. Gray, Boston, Mass.:

I claim as a new article of manufacture, a paper shirt collar struck up or pressed from a flat piece into any desirable form, substantially as described and for the objects specified.

38,161.—Gang Plow. Jacob Haege, Shiloh, Ill.:

I claim, first, The combination and arrangement of the pole, G, axle, E, vertical rod, H′, and draught rod, J, substantially as shown, to admit of the lateral adjustment of the draught relatively with a gang plow, as set forth.

Second, The particular manner of attaching the pole, G, to the axle, E, to wit, by means of the socket, b, fitted on the axle, E, and arranged in such a manner as to receive the pole, G, and having a screw, e, passing vertically through it and through the oblong slots, f g, in the axle and pole, whereby the pole, G, is firmly secured to the axle, E, and the former permitted to be readily adjusted when desired.

[This invention consists in constructing and arranging certain parts pertaining to the gang plow, in such a manner that the draught may be regulated so as to give the plows more or less land, as it is technically termed; that is to say, a tendency for the plows to work or move toward or from the unplowed surface, as may be required, and also to admit of the plows being adjusted nearer together or further apart, as may be desired, as well as to admit of the plows being readily raised or lowered at the will of the driver.]

38,162.—Lamp.—H. W. Hayden, Waterbury, Conn.:

I claim the circular wick and tube, c, in combination with the deflector, h, slotted as specified, and with the glass chimney, g, having a draught space between the base of said chimney and the deflector, for the purposes and as specified.

I also claim the perforated air-distributer, e, in combination with the said circular wick, c, slotted deflector, h, and glass chimney, g, for the purpose of regulating the action of the air, as set forth.

38,163.—Reflector for Lamps.—H. W. Hayden, Waterbury, Conn.:

I claim a reflector or shade surrounding the lamp chimney in combination with the spring ring and hinges, as set forth, so as to allow of the inclination of said shade or reflector, as specified.

38,164.—Tagged Braid for Shoe-strings.—James Hill, Providence, R. I.:

I claim the described improved manufacture of double-tagged braid, capable of being made into tagged shoe-strings by severing each double-tag blank at its middle, as specified.

38,165.—Friction Wheel for driving Machinery.—Jonas Hinkley, Norwalk, Ohio:

I claim the wheel, A, having a grooved periphery, a, in combination with the wheel, B, formed of a fixed part, b, and a sliding part, b′, provided respectively with the springs, F F, and screws, G, and arranged to operate in connection with the wheel, A, as and for the purpose herein set forth.

[This invention consists in the employment of a grooved driving wheel in connection with an expanding wheel arranged in such a manner that it will press against the sides of the groove in the driving wheel, and create sufficient friction to cause the rotation of the expanding wheel, the latter being so constructed as to be capable of being adjusted to regulate the pressure and friction, as may be required.]

38,166.—Railroad Car Brake.—Joseph Hough, Buckingham, Pa.:

I claim, first, The manner of winding up the chain, X, to operate the bars, U, to wit, by having the shaft, Y, fitted in swinging pendants, Z, attached to the locomotive and provided with wheels, A′, which are brought in contact with the treads of the wheels, B′, or with the axle thereof, by any suitable mechanism under the hand of the engineer or an assistant.

Second, The bars, U, provided with a spiral spring, V, when arranged in connection with the chains, W W, and buffer-head bars, P, to operate substantially as and for the purpose herein set forth.

Third, The sliding bar, M, in connection with the arm, L, shaft, K, provided with the arms, J J, and the chains, I, connected to the arms, J J, and the rods, H′ H′, of the brake mechanism, arranged substantially as and for the purpose herein set forth.

Fourth, The arrangement of the chains, W W, fixed pulleys, S, and the pulleys, R, on the buffer-head bars, P, and the pivoted bars, Q′, to operate as shown, and keeping the chains, W W, at a proper state of tension during the movement of the bars, P, as specified.

Fifth, The combination of the buffer-head bars, P, bars, U, chains, W W, pulleys, R S, slide bars, M, arm, L, shaft, K, with arms, J J, attached chains, I I, and rods, H′ H′, the latter being connected with the brake mechanism and all arranged to operate as and for the same purpose herein set forth.

38,167.—Apparatus for stirring and mixing Soaps, Colors, &c.—Henry Hungerford, New York City. Ante-dated March 7, 1863:

I claim the form and construction of the vessel, A, for mixing soaps, colors and substances made up of different ingredients, substantially as and for the purposes set forth.

I also claim the arrangement, substantially as described, of the arms, C C′, &c., on the shaft, B, or their equivalent, so as to give a lifting or upward, and at the same time a lateral motion to the article being mixed, substantially as and for the purposes set forth.

I also claim the combination of the shaft, B, with its arms, C, or their equivalent, with the mixing vessel, A, or with a mixing vessel of other shape, for the purposes set forth.

I also claim the application of the valve, D, in combination with a mixing kettle, A, substantially as and for the purposes set forth.

38,168.—Device for inserting the Gores of Shoes.—J. M. Hunter, New York City:

I claim affixing the elastic gore by means of a clamp of metal, or equivalent device, whereby the said gore may be taken out and replaced, substantially as set forth.

38,169.—Hog-cholera Medicine.—Franklin La Rew, Hamilton, Ohio:

I claim the combined use of the above-named ingredients, when prepared and used in the manner and for the purpose specified.

38,170.—Lamp.—C. B. Lasher, New York City:

First, I claim the wick case, g, extending from the wick tube and gradually supplied with oil or fluid from the reservoir through a small hole, 2, or its equivalent, as set forth and for the purposes specified.

Second, I claim the cap, d, attached directly to the surface of the reservoir itself in combination with the vent, 1, for the purposes set forth.

Third, I claim the screw rod, k, and hole, 3, in combination with the wick case, g, for regulating the supply of oil to said case, as set forth.

38,171.—Cultivator.—Alfred Leigh, Clinton Station, N. J.:

I claim the arrangement of the frame, A, with wheels, B B′, adjusting levers, C, furrowing shares, E, hinged cultivator teeth, F, and swivel bar, G, with marker, H, all constructed and operating in the manner and for the purpose herein shown and described.

[The invention consists in the arrangement of a frame with four wheels and a draft pole sufficiently elevated to pass over the growing plants, the hind wheels being on the ends of bent beams, so that by means of said levers the whole can be moved up and down, and thereby the frame raised or lowered at pleasure for the purpose of regulating the depth of the furrows or throwing the plow-shares out of the ground when desired; the furrowing shares being secured to the rear ends of the longitudinal timbers or beams of the frame and the cultivating shares being hinged to a crossbar and arranged so that they can be turned up when not used and turned down when they are to be brought in action.]

38,172.—Rudder.—Henry Lumley, Chancery Lane, London, England. Patented in England April 19, 1862:

I claim the attachment of the tail, B, to the stern-post, C, by means of chains, D1 D2, or equivalent fastenings, which pass obliquely through the body, A; the several parts being constructed and operating substantially in the manner and for the purpose herein shown and described.

38,173.—Skate.—Charles H. Marvin, New York City:

I claim having the heel part of the skate provided with a rotating screw, the point and thread of which project above the surface of the skate footpiece and enter a nut in the boot-heel, while the head of said screw is placed below the foot-piece and projects beyond the sides of the runner, as herein shown and described; so that by turning the head of said screw, the skate may be quickly fastened to or removed from the foot, all as set forth.

[This invention relates to an improved mode of attaching the back part of the skate to the heel of the boot or shoe, whereby a very firm attachment of the aforesaid parts is obtained, and by a means which will admit of the parts being attached and detached with the greatest facility.]

38,174.—Stove.—James Morrison, Jr., Troy, N. Y.:

I claim supplying the oven, f, with a continued current of hot air by means of the cold air chamber, u, outside of the front plate, y, with openings, o, in the bottom thereof, and the hot air chamber, e, between the said cold air chamber and the fire chamber, a substantially as herein described and set forth.

I also claim the downward projection, s, in combination with the bottom oven plate, w, substantially as and for the purpose herein described and set forth.

I also claim the combination of the hollow walls or tubes, m m, and the vertical hollow walls or tubes, z z, with the oven, f, substantially as and for the purpose herein described and set forth.

38,175.—Post-office Stamp.—Marcus P. Norton, Troy, N. Y.:

I claim, first, The canceling device, C, with wood, cork, or rubber type or blotter, G, therein or any device substantially the same, so as to cancel the postage stamps with indelible ink substantially as herein described and set forth.

Second, I also claim the canceling device, C, with wood, cork, or similar material forming the type or blotter, G, therein, in combination with the cross piece, B, and with the post-marking device, D, substantially as herein described and set forth.

38,176.—Combined Lever and Crank Motion.—Elias Nott, Earl Township, Pa.:

I claim the combined arrangement of the vibrating arms, D N, connected by the wires, L1 L2, supported in vibrating links, M1 M2, substantially in the manner set forth, in connection with the arms, C F (on arm or beam, D), for working the pump and other appliances, at one and the same time as herein specified for the purposes mentioned.

38,177.—Bird Cage.—Charles L. Osborn, Brooklyn, N. Y.:

I claim, first, The door, P, constructed and operating substantially as set forth.

Second, The combination in a cage of base, A, portable pan, L, wire bottom, K, and tubular frames, B and C, &c., or their equivalents, constructed and arranged substantially as specified.

38,178.—Car Coupling.—James H. Osgood, Jr., Boston, Mass.:

I claim the link, C, provided with the prong, d, and hole, e, constructed and operating substantially as described.

38,179.—Thrashing Machine.—Jesse Reed, Marshfield, Mass.:

I claim the combination of the yielding lip, E, with the revolving beater, B, and the feeding board, D, or its equivalent; the arrangement of the revolving beater, B, or the driving shaft thereof, the feeding board, D, and its opening, i, being as and for the purpose substantially as described.

38,180.—Scroll for Water Wheels.—Timothy Rose, Cortlandville, N. Y.:

I claim the movable gage piece or false side, D, to the scroll in combination with one or more trap or stop gates, C, as above described and for the purposes set forth.

38,181.—City Railroad Car.—Jacob Ruth, Philadelphia, Pa.:

I claim, first, Shields or guards of appropriate form, arranged adjacent to the wheels of city railroad cars, and secured to a frame resting on and supported by the axles, and independent, as regards vertical position, of the frame which supports the body of the car substantially as set forth for the purpose specified.

Second, The rocking frames, N N, hung to the within described inner or independent frame, furnished with guards, h h, and beveled shields, M M, the whole being arranged and operating substantially as and for the purpose herein set forth.

Third, The combination of rocking frames, N, sleeve, W, with its arms, n n n n, and p p, and springs, X X, or their equivalents.

Fourth, The brake levers, P, hung to the inner or independent frame, jointed to each other, and operating substantially as set forth.

38,182.—Car and Truck Connection.—Josiah J. Sherman, Albany, N. Y.:

I claim, first, The employment or use of balls, E, or rubbers, F′, interposed between the trucks and the car body in suitable boxes, when the said parts are constructed and combined, in the manner herein specified, so as to permit free motion of the car body laterally in either direction, and afterwards restore it automatically to its normal position.

Second, The combination of the annular springs, g, with the bearings, e f h i j, or any of them, when arranged to operate in the manner and for the purposes herein specified.

[The object of this invention is to diminish the lateral force upon the rails of a railroad and the wheels of a car truck caused by the lateral movement of the car, to ease the motion of the car, and to facilitate the required changes in the relative position of the trucks of a car in turning or passing over curves.]

38,183.—Combined Bag-holder and Elevator.—George H. Smith, Des Moines, Iowa:

I claim the combination of the adjustable arms, D, and hooks, g, with the movable frame, A, rising and falling platform, C, rope, h, windlass, E, ratchet wheel, n, and pawl, o, all constructed and operating in the manner and for the purpose set forth.

[The principal object of this invention is to enable the laborer to fill grain bags without assistance and to elevate the same to a convenient hight from the floor, so as to load them unto his shoulder without having to stoop over or require other help.]

38,184.—Setting for Jewelry.—Samuel J. Smith, New York City:

I claim the setting composed of the two frames or plates, A B, combined by means of the pieces, b b, and spurs, d d, the back frame, A, being furnished with clamps, c c, and the front one, B, with projecting strips, e e, or their equivalents, substantially as herein set forth.

[This invention consists in an open setting composed of two separate plates or frames constructed and combined in a novel manner and having a novel arrangement of clamps for securing the stones, such setting being made with a small expenditure of labor and being very strong and light, and showing the stones to great advantage, and being suitable for brooches, pins, rings, and other articles of jewelry.

38,185.—Automatic Grain Scale.—Andrew Steveley, Fond du Lac, Wis.:

I claim, first, The arrangement of the chutes, E and F, in the hopper substantially as and for the purposes herein specified.

Second, The arrangement of the valve, V, provided with the pin, d, or its equivalent and the bar, m, when used in connection with a revolving scale and constructed and operating substantially as and for the purposes delineated and set forth.

Third, I claim the employment for the purposes herein specified of a revolving scale, M, constructed and operating substantially as herein set forth and described.

38,186.—Furnace for smelting Ores and for other purposes.—George W. Swett, Troy, N. Y.:

I claim the construction of a furnace combined of the parts described, or their equivalents, in the manner and for the purposes above specified.

38,187.—Hydraulic Lifting Jack.—James Tangye, Birmingham, England. Patented in England, Feb. 27, 1862:

I claim, first, The arrangement and combination of the parts of hydraulic lifting jacks hereinbefore described and illustrated in Figures 1, 2 and 3, of the accompanying drawing.

Second, The arrangement and combination of the parts of the pumps of hydraulic lifting jacks hereinbefore described and illustrated in Figures 1, 2 and 3, of the accompanying drawing.

Third, The arrangements and combinations of the parts of the pumps of hydraulic lifting jacks by which the lowering of the said jacks is effected as hereinbefore described and illustrated in Figures 2, 4 and 5, of the accompanying drawing.

38,188.—Coal Scuttle.—W. B. Treadwell, Albany, N. Y.:

I claim the convexo-concave shield, B, in combination with the straps, a, and the rods, e, operating in the manner herein set forth.

38,189.—Lantern.—F. G. Tucker & A. Crawford, Albany, N. Y.:

We claim, first, The cells, s s, with the shelf, m, in cylinder, E, and the cells, t t, with the shelf, n, in the cylinder, B, for the purposes set forth.

Second, The partition, p, with the openings, y, in cylinder, B, to shield the heat from the cap of the lantern.

Third, The cylinder, D, with its orifice, k, and slot, v, arranged to slide within the cylinder, E, so as to accommodate the shaft, k, of the wheel-wick trimmer, in combination with the cells, shelves and partition aforesaid.

Fourth, The springs, e e, as arranged to secure the cylinders, D and E, to each other in combination with said cylinders and with the cells, shelves and partition aforesaid.

Fifth, The combination of the whole lantern as represented and set forth, embracing the said cells, shelves, partition, cylinders, orifice, and slot and springs, as applied to any of the lamps and burners now in common use, the whole to be made as represented and for the purposes herein set forth.

38,190.—Machinery for making Covered Twist and Cord.—John Turner, Norwich, Conn., and Isaac E. Palmer, Montville, Conn.:

I claim the combination, with the elongated spindles, F, and the obbins, H, and their discs, H′, of the hollow spindles, G, the bobbins I, and the bobbin discs, I′, the latter revolving independently of and at greater velocity than the discs, H; all in the manner and for the purpose herein shown and described.

[This invention consists in the arrangement of the yarns or threads of cotton or other fibrous material which are to form the body of covered twist and the yarns or threads of silk or other fibrous material which are to form the covering of the same on two series of bobbins or their equivalents, each of such series carried by one of two separate spindles, one of which is hollow, and which are arranged with their axes in line with each other and which rotate either at different velocities in the same direction or in different directions, by which means the several yarns or threads which form the body are twisted together, and the several yarns or threads which form the covering are wound upon the body of the twist by one continuous operation, in a more simple and perfect manner than by the means heretofore adopted for the purpose.]

38,191.—Grain-dryer.—Jesse B. Wheeler, Bolton, Mass.:

I claim, first, In arranging the walls for forming the dust space, I, as above described in combination with the guiding plates, J, substantially as herein described, and for the purpose set forth.

I also claim in combination with the hot air chamber, E, perforated bottom, C, and the stirring and moving arms traversing over it, the exhaust fan, D, for drawing the heated air up through the grain and through the machine substantially as described.

I also claim in combination with the hinged apron, K, over lying the cool air chamber, L, the raising and lowering rods, o o, and hinged valve, s, so that said apron may be raised or adjusted without opening the chamber, L, substantially as described.

I also claim as a stirring and moving mechanism or device, the arms, h h, hinged, made adjustable and moved by endless chains, substantially as herein described and represented.

38,192.—Clew Thimble.—William W. Wilcox, Middletown, Conn.:

I claim the application to a clew thimble, B, of a guard, a, constructed and operating in the manner and for the purposes substantially as shown and desbribed.

[This invention consists in the application to the clew thimble of a guard cast with the same out of one piece, or otherwise secured to the same in such a manner that the rope passing over said thimble is protected against the chafing motion of the clew-line block, and no further protection to the rope is needed to save it against injury from that cause.]

38,193.—Direct-acting Engine.—Louis Winterbauer, New York City:

I claim, first, So combining the secondary cylinder, C′, with the slide valve, D, tappet, m, and cam, F, that by the motion of the secondary cylinder at the end of each stroke, the tappet, m, is carried back to its central position ready to be acted upon by the cam, F, substantially in the manner and for the purpose shown and described.

Second, The exhaust port, e, of the secondary cylinder in combination with the exhaust port, c, of the main cylinder substantially as described when so arranged that the secondary cylinder exhausts through the same port with the main cylinder.

38,194.—Grate.—Charles J. Woolson, Cleveland, Ohio:

I claim the construction and arrangement of the air chambers, sec-

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tions, A and B, with the opening, C, beneath the grate, G, the deflecting plate, B′, and opening or openings, E, substantially as and for the purpose herein set forth.

38,195.—Loom.—Wm. Breitenstein (assignor to M. Fischel & Co.), New York City:

I claim operating and controlling the operation of a divided take-up by jacquard mechanism, so that the action of the several sections of the take-up shall be determined thereby, for the purpose herein set forth.

38,196.—Stereoscopic Instrument.—Ernst G. Chormann, Philadelphia, Pa.:

I claim, first, The frame, C, having lenses adjustable in the manner described, or any equivalent to the same, and the casing, B, in combination with the box, A, or its equivalent, the whole being constructed and arranged substantially as and for the purpose herein set forth.

Second, The arms E and E′, with their rings and lenses, when hung to the frame, C, and arranged for ready adjustment, and for folding together substantially as set forth for the purpose specified.

Third, The spring, a, when combined with the box, A, casing, B, and frame, C, as set forth.

38,197.—Stereoscopic Instrument.—Ernst G. Chormann, Philadelphia, Pa.:

I claim the frame, B, with its elastic legs, d and d′, or their equivalents, and arms, E and E′, carrying appropriate lenses, in combination with the case, A, of any suitable material, the whole being constructed and arranged substantially as and for the purpose herein set forth.

38,198.—Mode of producing Designs on Textile Fabrics, &c.—Edward Leitenberger, Reichstadt, Bohemia, assignor to Augustus G. Scheller, New York City:

I claim, first, Imparting to the material to be printed a lateral vibrating motion during the operation of printing substantially as and for the purpose specified.

Second, The combination with the printing roller, C, and pressing roller, B, of the laterally vibrating roller, I, constructed and operating substantially as and for the purpose shown and described.

Third, The arrangement of the angular levers, G, and weighted cylinder, H, in combination with the gudgeons of the let-off roller, F, of a printing machine constructed and operating substantially as and for the purpose set forth.

38,199.—Coal-oil Lantern.—P. J. Clark (assignor to S. S. Clark, West Meriden, Conn.:

I claim the peculiar construction and arrangement, herein shown and described, of the jacket, H, in combination with the lamp, E, and burner, G; so that while the lower part of the air-duct is open and free, the upper part or space, d, will be narrow and thus compress the air into a thin sheet, and cause it to shoot with increased velocity into the interior of the burner, all as set forth.

[This invention relates to a lantern for burning coal oil without the aid of a draught chimney, and has for its object the supplying of the flame of the lamp with a requisite amount of air to support proper combustion for illuminating purposes, and at the same time admitting the oil into the lantern in such a manner that the flame will not be extinguished by an up-and-down or, swinging movement of the lantern.]

38,200.—Printing Machine.—William Bullock (assignor to himself, Calvin Adams & G. S. Selden), Pittsburgh, Pa.:

I claim, first, The feeding of the paper into the printing machine from a continuous roll or web, by means of a feed roller revolving in contact with the paper roll, which rests against it.

Second, Hanging the shaft of the spool, or axis of the roll of paper, in bearings at one extremity of two arms, which are rigidly attached at their other extremity to a shaft, which is left free to turn on its axis in a fixed bearing, whereby the roll of paper is kept in an accurately horizontal position, at right angles to the path of the paper through the machine.

Third, Placing the bearings of the arms which carry the spool of paper, below but not directly under the feed roller, so that, being slightly inclined toward the feed roller, the roll of paper will press with a portion only of its weight thereon, in order that the angle of inclination may be gradually increased by the diminution in size of the roll of paper as it is unwound from the spool, and thus, although its weight is continually decreasing, the relative degree of pressure upon the feed roller may be correspondingly increased, and thereby an uniform actual pressure be maintained.

Fourth, The use of a counterpoise, so connected with the shaft and arms which carry the spool of paper, as that, by adjusting the counterpoise, the degree of pressure on the feed roller of the roll of paper can be so regulated as to cause the paper to unwind on to the feed roller, without the roll of paper on the spool becoming loosened, as it would do were the whole or too great a proportion of the weight of a large roll of paper allowed to press upon the feed roller.

Fifth, Combining in one the feed roller and one of the cutting cylinders, substantially as hereinbefore described.

Sixth, The use of grippers, or other equivalent device for seizing the sheets of paper, on the feed roller, and thereby causing it to carry the sheets of paper directly to the first impression cylinder, substantially as described.

Seventh, Transferring the sheets of paper from a feed roller, moving at a slower speed, to the impression cylinder, or that device which carries the sheets forward from the cutters to the type cylinder, moving at a higher speed, by means of a pair of grippers on the feed roller and on the impression cylinder, without the use of tapes, or other similar device for the purpose, and thus leaving a space between the sheets of paper as they pass through the machine, without checking or intermitting the feed.

Eighth, The use of a set of grippers on one of the cutting cylinders, which are opened and closed by a stationary cam, or other equivalent device, by means of which such cutting cylinder also performs the work of a "layer-on," seizing the end of the paper before it is severed from the web, and carrying it round to the point of contact of such cutting cylinder with the first impression cylinder, which latter takes the sheet as the cutting cylinder yields it up; the cutter on the male cutting cylinder severing the paper when a sheet of sufficient length has passed between the cutting cylinders.

Ninth, The employment of a yielding sheath, consisting of two strips, placed one on each side of a serrated cutter, for the purpose of holding the paper firmly against the edges of the slot in the female cutting cylinder, while the cutter is severing a sheet of paper from the web; and also for the purpose of pressing the loose ends of the web or uncut sheet as it passes between the cutting cylinder immediately after the sheet which had just been severed therefrom, toward the opposite cutting cylinder, until the grippers on the cutting cylinders seize hold of it, and thus preventing the paper from passing down out of the reach of the grippers.

Tenth, Permitting the escape from the machine of any piece of paper which the grippers on the large cutting cylinder fail to take hold of, or of any part of a sheet which may be torn from the web, by leaving a free passage between the large cutting cylinder and the first impression cylinder; so that such scrap will fall away, when severed from the web by the cutter, without being seized by the grippers on the first impression cylinder; or being carried any further through the machine, thus preventing the clogging of the machine, and removing a fruitful source of annoyance and delay in the operation, and damage to the machine.

Eleventh, Transferring the sheet of paper, after it is printed in white, immediately from the first to the second impression cylinders, by means of the grippers placed on the second impression cylinder, which seize the sheet of paper just as the grippers on the first impression cylinder release it, without the use of tapes, cylinders or other mechanical devices, not contained in the impression cylinder, for the purpose substantially as described.

Twelfth, The use of a scrap blanket or apron interposed between the cutting apparatus and the type cylinder and inking apparatus, to prevent any dust or scraps of paper from falling on the type or inking cylinders.

Thirteenth, The delivering apparatus, consisting of short fly-rods, having a rapid stroke in a small arc up and down, so as to strike the rear end of the printed sheets as they pass from the machine; in combination with the curved fingers, for holding the rear end of the sheets during the up-stroke of the fly-rods and until their down-strokes, and of a roller to receive the stroke of the fly-rods and the pressure of the curved fingers, and by an intermitting rotation to pass the sheets forward when released by both fly-rods and curved fingers, or other equivalent device, by which the paper is arrested at its rear end on its passage from the machine, whereby a very rapid delivery of the sheets is effected.

Fourteenth, The use of a delivering table for the reception of the printed sheets, beneath and in the rear of the delivering apparatus, which table remains stationary during the delivery of the printed sheets, until a certain number, say fifty or one hundred, have been deposited upon it, when it suddenly moves an inch or two to one side, and is again stationary, until an equal number of sheets are delivered, when it moves back again; and so on, alternating from side to side, for the purpose of counting and separating the sheets into files of any required number; substantially in the manner hereinbefore described.

Fifteenth, Communicating an alternating lateral movement to the small ink-distributing rollers, on the face of the large ink-distributing cylinder, by giving a simultaneous reciprocating motion to one end of their bearings, for the purpose of securing a more perfect and uniform distribution of the ink.

38,201.—Manufacture of Gun Barrels.—R. A. Douglas, Orange, N. J., assignor to Edward Robinson, New York City:

I claim the method, herein described, of making gun barrels, by drawing the same from a cylinder of malleable iron previously drilled, substantially as herein set forth.

38,202.—Bedstead.—David Manuel (assignor to himself and John M. Kelly), Lancaster, Pa.:

I claim, first, The conically-coiled spring, D, for the support of the bearing, E, with its additional spring-rod and hinge, G, shouldered for the loops or bracelets, f, on the slats, F, in combination with the supporting and wedging cross-bar, B, and boxes, C, all arranged and applied in the manner and for the purpose specified.

Second, The slotted and tongued bed-rail fasteners, H K, constructed, operated and applied substantially in the manner specified.

38,203.—Strike for Door Latches.—James E. Terry, Philadelphia, Pa., assignor to The Russel & Erwin Manufacturing Company, New York City:

I claim a strike provided with two latch openings, b b, side by side, an inclined projection, f, and a central partition plate, c, all arranged substantially as and for the purpose herein set forth.

[The object of this invention is to obtain a strike for door locks which will be capable of being applied, without being inverted or reversed in position, to the frame of either a right or left-hand door. The invention is designed to be used with what is generally known as a carpenter's lock, or that which has a latch or rising and falling bolt.]

38,204.—Revolving Fire-arm.—Frank P. Slocum (assignor to Samuel B. Slocum), Brooklyn, N. Y.:

I claim, first, The construction of a revolving fire-arm with independent, longitudinally movable chambers, in combination with openings in the sides of the cylinder of sufficient size to permit the lateral insertion of metallic cartridges, without removing the chambers entirely from the cylinder.

Second, The stationary piston, applied in combination with the revolving cylinder and its independently movable chambers, substantially as and for the purpose herein described.

38,205.—Shade Rack.—William Webster, Morrisania, N. Y., assignor to Charles Goodyear, Jun., New York City:

I claim, first, The employment and use of an elastic or flexible roller in racks, substantially as herein set forth and described.

Second, The employment and use of an adjustable spring in racks, substantially as herein set forth and described.

38,206.—Defensive Armor for Ships and other Batteries.—Charles W. S. Heaton, Belleville, Ill.:

I claim the employment of wood, or its equivalent, when used in the manner and for the purpose substantially as described.

RE-ISSUES.

1,451.—Cartridge Box.—Augustus A. Bennett, Cincinnati, Ohio. Patented Jan. 27, 1863:

I claim, as a new and useful article of manufacture, the cartridge box, A B, whose cover is made self-closing by means of one or more metallic springs, constructed, adapted and operating substantially as described.

1,452.—Wood-saw Frames.—William H. Livingston, New York City. Patented Sept. 18, 1860:

I claim, first, The brace, E, applied to the frame of a hand saw between the cross-piece and the end piece of said frame, in the manner and for the purposes substantially as specified.

Second, The combination of the brace rod, E, and metal plate, D, arranged or applied to the saw frame, substantially as and for the purpose set forth.

1,453.—Manufacture of Metallic Zinc.—Alfred Monnier, Philadelphia, Pa. Patented May 18, 1858:

I claim the process of obtaining metallic zinc by the combination of the two metallurgic operations substantially as herein specified.

[This improvement consists in obtaining metallic zinc by a combination of two metallurgic operations, viz: first, separating the oxides of zinc from the rest of the ore, by applying to the ore in a suitable furnace a degree of heat such as would separate the oxyd of zinc, or a large portion of it, by volatilization, from the gangue or other metals contained in the ore, or by treating the ore with heat in connection with lime, or other flux, the more effectually to remove the gangue and other metals from the oxide of zinc, and, second, treating the oxide of zinc, so obtained, by heat and carbon in a suitable retort or muffle and thereby obtaining therefrom metallic zinc.]

1,454.—Skate.—Willis L. Gregory and G. Landon, Jun., of Amsterdam, N. Y., assignees of said Willis L. Gregory. Patented March 4, 1862:

I claim, first, a detached washer or socketed plate which has a vertical and a longitudinal channel formed in it, the two channels intersecting one another, the said washer plate answering as an auxiliary to a skate-runner fastening, *i. e.*, a detached screw, substantially as and for the purpose set forth.

Second, Interposing between the wooden stock and the metal runner, a detachable longitudinally-grooved and vertically-perforated washer or socketed plate, in such manner that it braces the wooden stock, gives side bearings to the runner and also enables the runner to have end bearings, substantially in the manner set forth.

Third, The combination of the longitudinally-slotted and vertically-perforated washer or socketed plate, D, with a detachable "wood" screw which extends up through the washer and the stock of the skate, in the manner and for the purpose substantially as described.

Fourth, The combination of shoulders or standards of a skate runner, and a detachable longitudinally-slotted and vertically-perforated washer or socketed plate, substantially as and for the purpose set forth.

Fifth, A detachable screw as a part of a skate runner fastening, with two sides of its head made parallel and flush with the sides of the runner below the washer or socketed plate, in the manner herein described for the purpose set forth.

Sixth, The combination of the dove-tail notch in the upper edge of the skate, the loose screw fastening and a longitudinally-grooved and vertically-perforated washer, substantially as and for the purpose set forth.

Seventh, The combination of the recesses in the skate stock, a metal socket plate with a longitudinal groove and a vertical perforation and a screw fastening, substantially as and for the purpose set forth.

Eighth, The combination of the screw or screws, notch or notches for the heads of the screw or screws, longitudinally-grooved washer or washers and the nut or other equivalent fastening or fastenings, as a means of uniting the stock and runner of a skate, substantially as described.

DESIGN.

1,476.—Stove Plate.—James L. Collins, Chicago, Ill.

EXTENSIONS.

Tool for attaching Tubes to Boilers.—Thomas Prosser, New York City. Patented April 17, 1849:

I claim the combination of the guide ring, having mortises therein, with the segmental expanders and conical or pyramidical mandrel; constructed and operating substantially as herein described.

Secondly, I claim as separate and component parts of the same, the double projections on the segments, having a hollow between them to be placed opposite to the tube sheet while the tube is being expanded within it.

Thirdly, I claim the guide ring and mortises in the same, together with the projections on the segments to fit into them; I do not, however, confine myself to any specific number of segments, form of projection on the segments to fit into the mortise guide ring, or position of the mortise guide ring itself, which may be placed inside the tube, if required.

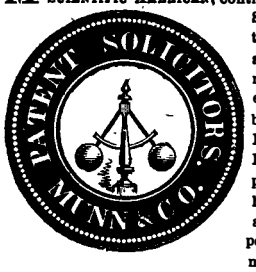
Yellow-metal Nail or Spike.—Samuel Crocker, Taunton, Mass. Patented April 17, 1849. Re-issued August 1st, 1854; again re-issued February 24, 1863:

I claim the new article of manufacture hereinabove described, viz.: a yellow-metal nail or spike made by the combined processes of heating the metal to redness, and in such state cutting and heading it in a nail machine, and subsequently treating it substantially as described; meaning by the term "yellow-metal" a metal composed of copper and zinc in the proportion in which they are usually combined in the manufacture of the well-known "Muntz sheathing metal."

IMPORTANT TO INVENTORS.

PATENTS FOR SEVENTEEN YEARS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.



THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent free of charge. Address MUNN & CO. No. 37 Park Row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands such examinations have been made through this office. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank-bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

The revised Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the Government fee required on filing an application for a patent is *reduced* from $30 down to $15. Other changes in the fees are also made as follows —

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country, we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

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CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park Row New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

Notes and Queries

A. A., of N. Y.—No dependance for accuracy can be placed upon the common reports which have been published respecting the difficulties of cutting a canal at Vicksburgh. It would therefore be out of place for us to discuss any question of engineering based upon such reports.

H. S., of Pa.—There is no formula by which an inventor can regulate the sale of rights under his patent so as to secure equal and exact justice to all purchasers. We can suggest no fixed rule on this point. We think as a general rule that purchasers get the best of the bargain.

. A. H., of N. Y.—If Mr. Miller's patent was granted in 1855 it will not expire until 1869. Patents issued in 1855 were granted for fourteen years.

E. M., of Mo.—Your method of bleaching wax, so far as we know, is new and patentable. There are no establishments in this vicinity, with which we are acquainted, where wax is bleached as a special part of the business.

T. H. M., of Pa.—Alcohol is a solvent of castor oil and with it forms a clear solution, but with olive oil it forms a milky solution. The alcoholic castor oil solution, colored with alkanet root, forms a tricopherous for the hair.

S. N., of Ill.—A correspondent whose letter is published on page 182, Vol. VI. (new series) of the SCIENTIFIC AMERICAN, states that the nitro-muriate of platinum is employed to form a dead black on brass, such as the eye-pieces of telescopes.

A. B., of Mass.—Any good treatise on photography will give you information respecting the strength of solutions for developing the impressions.

S. C. C., Jr., of Mass. and J. A. M., of Pa.—Your communications on aerostation have been received.

S. B. L., of R. I.—Corliss & Co., of Providence, R. I., will no doubt construct an air whistle for you, of the size you desire, to be operated with an air pump.

W. H. F., of Iowa.—We recommend you to get a good millwright to select the engine and boiler for your grist mill. Any respectable engineering establishment will build you a boiler and engine of the best quality, if a sufficient sum is paid for them.

H. W., of Pa.—The cement for stopping sand-holes in iron castings is made by mixing one part of flowers of sulphur and two parts of sal-ammoniac with eighty parts of coarsely-powdered iron turnings. Sufficient water is used to make this compound into a thick paste; it is used as soon as it is made, and the holes are plugged tight with it. This cement ultimately becomes as hard as the metal itself.

. T. V., of N. Y.—Gumboge (commonly called gamboge) is a yellow gum sold by all dealers in artists' materials. It is employed as a water color in painting, and for coloring lacquers or varnishes made of shellac.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, April 15, to Wednesday, April 22, 1863:—

J. F. R., of N. Y., $45; R. K., of Mass., $46; L. R., of N. Y., $20; J. P. H., of D. C., $20; H. F., of Ohio, $45; F. C. P., of N. Y., $16; N. P. O., of N. Y., $20; D. H., of N. Y., $20; J. B. R., of N. Y., $20; D. N. D., of N. J., $46; W. L. R., of Mass., $16; J. I., of Ohio, $25; H. S., of Pa., $12; A. M. B., of Mich., $16; A. W. S., of Mass., $25; M. M. & Co., of Ind., $16; N. S., of Ind., $25; J. J. R., of Vt., $16; A. C., of Pa., $15; J. De R., of Ohio, $16; G. N. D., of Ky., $25; G. W. H., of Iowa, $16; W. & T., of Mass., $25; T. S. D., of N. J., $250; W. & C., of N. H., $28; G. W. D., of N. Y., $25; J. F. J. G., of N.Y., $25; W. W., of Mich., $20; J. McK., of N. Y., $31; J. P. T., of N.Y., $61; W. J. S., of Ohio, $20; J. T., of N.Y., $20; G. A. D. of Cal., $20; F. W. G., of N.Y., $20; G. & V., of N.Y., $45; W. G. C., of N.Y., $59; J. W. D., of Conn., $20; A. F. W., of N. Y., $25; C. C. S., of Ill., $25; C. & T., of Conn., $25; J. S. C., of Mich., $15; R. H., of N. Y., $16; N. E. S., of Ind., $25; E. R. S., of Mich., $10; G. W. H., of N.Y., $153; P. K., of Conn., $20; G. C. R., of N. Y., $20; M. P. L., of Maine, $45; D. B. H., of N.Y., $20; J. F. H., of N.Y., $16; B. F. B., of N.Y., $20; C. F. T., of N. Y., $16; N. A. B., of N.Y., $45; H. B. J., of N.J., $20; C. L. A., of N. Y., $10; A. & W., of N. Y., $12; T. E., of R. I., $25; J. M., of Ky., $25; M. & H., of Ill., $25; G. W. G., of Ill., $25; D. R., of N. Y., $16; N. Z. P., of Ill., $25; W. J. S., of Ohio, $25; A. & H., of Mass., $58; S. & F., of R. I., $30; G. H., of N. Y., $15; G. E. H., of N. Y., $25; S. W. D., of N. Y., $10; P. & B., of Mass., $25; H. & S., of Pa., $25; T. O., of Mass., $21; A. H., of Iowa, $26; B. K., of Mo., $15; J. G., of Ill., $25; W. S. P., of Mich., $250; W. F. R., of N. Y., $16; D. R., of R. I., $16; G. B. F., of Ill., $30; T. W., of Mass., $17; W. M., of N. Y., $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office from Wednesday, April 15, to Wednesday, April 22, 1863:—

R. K., of Mass.; J. McK., of N. Y.; J. P. T., of N. Y.; C. F. T., of N. Y.; W. G. C., of N. Y.; C. L. A., of N. Y.; A. F. W., of N. Y.; A. and W., of N. Y.; W. M., of N. Y.; T. O., of Mass.; H. S., of Pa.; D. E. B., of Pa.; J. I., of Ohio; T. E., of R. I.; C. C. S., of Ill.; J. M., of Ky.; A. W. S., of Mass.; N. E. S., of Iowa; M. and H. of Ill.; N. S., of Ind.; N. Z. P., of Ill.; C. and T. of Conn.; C. M. L., of N. H.; J. K. H., of Ind.; A. and H., of Mass. (2 cases); H. and S., of Pa.; W. and C., of N. H.; C. St. J., of Mass.; P. and B., of N. Y.; G. B. F., of Ill.; G. W. D., of N. Y.; G. N. D., of Ky.; S. and F., of R. I.; J. G., of Ill.; G. E. H., of N. Y.; A. H., of Iowa; G. W. G., of Ill.; J. F. J. G., of N. Y.; A. C. F., of N. Y.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to compute the amount they must send in when they wish advertisements inserted, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

PROPOSALS FOR RIFLE CANNON.

ORDNANCE OFFICE, WAR DEPARTMENT, WASHINGTON, April 16, 1863.

PROPOSALS will be received at this office until 4 o'clock P. M., on the 2d day of MAY next, for the manufacture and delivery of thirty CAST-IRON SIEGE RIFLE CANNON of the caliber of four and a half inches. These cannon weigh, when finished, about 3,570 pounds. They are to be made in strict conformity to the drawing which will be furnished, and which may be seen at any United States Arsenal. They are to be cast hollow and cooled from the interior. They are to be subject to the regular United States inspection and proof, and none are to be received or paid for, but such as are accepted by the Inspector, whose decision as to the reception or rejection of any of them is to be final and conclusive.

Bidders will state the time they propose to deliver the first cannon, and the number they will deliver, weekly, thereafter. They will also state where they propose to manufacture them, and the price, per pound, for the finished cannon, delivered at the place of shipment nearest to the foundry where cast.

No bid will be entertained except from regular founders, evidence of which, and of their ability to fulfill a contract, if awarded to them, must accompany the bids, unless the bidder is known to this office.

Any bidder obtaining a contract will be required to enter into bonds with no less than two sureties, in the penal sum of $5,000 for the faithful fulfillment of his contract in all respects.

The right is reserved to reject any or all bids if the prices are deemed too high, or if, for any cause, it is not thought for the public interest to accept them. Proposals will be sealed and addressed to "Brig.-Gen. J. W. Ripley, Chief of Ordnance, Washington, D. C.," and will be indorsed "Proposals for 4½-inch Rifle Cannon."

JAMES W. RIPLEY,
18 2 Brig.-Gen. and Chief of Ordnance.

GUTTA-PERCHA CEMENT ROOFING.—THIS ROOFING is fire and water-proof—costs only about one-third as much as tin, and is far more durable. Can be applied by ordinary laborers—is adapted to old shingle roof as well as to new roofs, and answers equally well on steep or flat roofs.

LIQUID GUTTA-PERCHA CEMENT FOR COATING and preserving metal roofs, and for repairing leaky roofs of all kinds. These materials are shipped ready for use (no heat required). Full descriptive circulars, prices, &c., furnished by the JOHNS & CROSLEY MANUFACTURING COMPANY (sole manufacturers), 78 William street, corner of Liberty, New York. 18 4*

READY ROOFING.—THIS ARTICLE IS MADE OF the thickest woven fabric ever used for roofing; invented and manufactured expressly for our own use. (See page 176 of the current volume of the SCIENTIFIC AMERICAN for full description.) Needs no coating of cement to be spread upon the surface after being nailed upon the roof-boards, as every other kind of roofing does. It costs less than half the price of tin, is far more durable, and is easily applied by any one. READY ROOFING COMPANY, 73 Maiden Lane, New York. 18 4*

STEAM AND WATER GAGES, GLASS TUBES, PATENT gage-cocks whistles and engine counters for sale; also indicators for ascertaining the working horse-power of steam engines, heat gages and signal gongs for steamboats. E. BROWN, 311 Walnut street, Philadelphia, Pa. 1*

WOOD-WORKING MACHINERY, DESIGNED FOR the manufacture of cars, carriages, sash, blinds, doors, moldings, patterns, piano-forte and cabinet work, agricultural implements, packing boxes, lumber, &c. Made by RICHARDSON, MERIAM & CO., Worcester, Mass 18 5*

THE PRACTICAL DRAUGHTSMAN'S BOOK OF INDUSTRIAL DESIGN. Just published and now ready for delivery. "The Practical Draughtsman's Book of Industrial Design, and Machinist's and Engineer's Drawing Companion;" forming a complete course of Mechanical Engineering and Architectural Drawing. From the French of M. Armengaud the elder, Professor of Design in the Conservatoire of Arts and Industry, Paris, and MM. Armengaud the younger and Amouroux, Civil Engineers. Re-written and arranged, with additional matter and plates, selections from and examples of the most useful and generally employed mechanism of the day. By William Johnson, Assoc. Inst. C. E., editor of *The Practical Mechanic's Journal*. Illustrated by 50 folio steel plates and 50 wood-cuts. 4to., $7 50.

Among the contents are:—*Linear Drawings, Definitions and Problems:* Plate I.; Applications, Designs for Inlaid Pavements, Ceilings and Balconies: Plate II.; Sweeps, Sections and Moldings; Plate III.; Elementary Gothic Forms and Rosettes; Plate IV.; Ovals, Ellipses, Parabolas and Volutes; Plate V.; Rules and Practical Data; *Study of Projections:* Elementary Principles: Plate VI. Of Prisms and other Solids; Plate VII.; Rules and Practical Data; *On Coloring Sections with Applications*—Conventional colors, Composition or mixture of Colors: Plate X.; *Continuation of the Study of Projections*—Use of sections—details of machinery: Plate XI., Simple applications—spindles shafts, couplings, wooden patterns: Plate XII, Method of constructing a wooden model or pattern of a coupling, Elementary applications—rails and chairs for rail ways: Plate XIII.; *Rules and Practical Data*: Strength of material, Resistance to compression or crushing force; Tensional resistance, Resistance to flexure, Resistance to torsion, Friction of surfaces in contact.

THE INTERSECTION AND DEVELOPMENT OF SURFACES, WITH APPLICATIONS.—*The Intersections of Cylinders and Cones:* Plate XIV.—*The Delineation and Development of Helices, Screws and Serpentines:* Plate XV., Application of the helix—the construction of a staircase: Plate XVI., The intersection of surfaces—applications to stop-cocks: Plate XVII.; *Rules and Practical Data*, Steam, Unity of heat, Heating surface, Calculation of the dimensions of boilers, Dimensions of fire-grates, Chimneys, Safety-valves.

THE STUDY AND CONSTRUCTION OF TOOTHED GEAR—Involute, cycloid and epicycloid: Plates XVIII and XIX., Involute: Fig. 1, Plate XVIII., Cycloid: Fig. 2, Plate XVIII. External epicycloid, described by a circle rolling about a fixed circle inside it: Fig. 3, Plate XIX. Internal epicycloid: Fig. 2, Plate XIX. Delineation of a rack and pinion in gear: Fig. 4, Plate XVIII. Gearing of a worm with a worm-wheel: Figs. 5 and 6, Plate XVIII.; *Cylindrical or Spur Gearing:* Plate XIX. Practical delineation of a couple of spur-wheels: Plate XX.; *The Delineation and Construction of Wooden Patterns for Toothed Wheels:* Plate XXI.; *Rules and Practical Data:* Toothed gearing, Angular and circumferential velocity of wheels, Dimensions of gearing, Thickness of the teeth, Pitch of the teeth, Dimensions of the web, Number and dimensions of the arms, Wooden patterns.

CONTINUATION OF THE STUDY OF TOOTHED GEAR—Design for a pair of bevel-wheels in gear: Plate XXII. Construction of wooden patterns for a pair of bevel-wheels: Plate XXIII.; *Involute and Helical Teeth:* Plate XXIV.—*Contrivances for obtaining Differential Movements*, The delineation of eccentrics and cams: Plate XXV.; *Rules and Practical Data:* Mechanical work of effect, The simple machines, Center of gravity, On estimating the power of prime movers, Calculation for the brake, The fall of bodies, Momentum, Central forces.

ELEMENTARY PRINCIPLES OF SHADOWS—*Shadows of Prisms, Pyramids and Cylinders:* Plate XXVI.; *Principles of Shading:* Plate XXVII.; *Continuation of the Study of Shadows:* Plate XXVIII. *Tuscan Order:* Plate XXIX.; *Rules and Practical Data:* Pumps, Hydrostatic principles, Forcing pumps; Lifting and forcing pumps, The hydrostatic press, Hydrostatical calculations and data—discharge of water through different orifices, Gaging of a water-course of uniform section and fall, Velocity of the bottom of water-courses, Calculation of the discharge of water through rectangular orifices of narrow edges, Calculation of the discharge of water through overshot outlets, To determine the width of an overshot outlet, To determine the depth of the outlet, Outlet with a spout or duct.

APPLICATION OF SHADOWS TO TOOTHED GEAR: Plate XXX.—*Application of Shadows to Screws:* Plate XXXI.; *Application of Shadows to a Boiler and its Furnace:* Plate XXXII.; *Shading in Black—Shading in Colors:* Plate XXXIII.

THE CUTTING AND SHAPING OF MASONRY: Plate XXXIV.—*Rules and Practical Data*, Hydraulic motors, Undershot water wheels, with plane floats and a circular channel, Width, Diameter, Velocity, Number and capacity of the buckets, Useful effect of the water wheel, Overshot water wheels, Water wheels with radial floats, Water wheel with curved buckets, Turbines. *Remarks on Machine Tools.*

THE STUDY OF MACHINERY AND SKETCHING.—Various applications and combinations: *The Sketching of Machinery:* Plate XXXV. and XXXVI.; *Drilling Machine; Motive Machines;* Water wheels, Construction and setting-up of water wheels, Delineation of water wheels, Design for a water wheel, Sketch of a water wheel; *Overshot Water Wheels; Water Pumps:* Plate XXXVII; *Steam Motors;* High-pressure expansive steam engine: Plates XXXVIII., XXXIX. and XL.; *Details of Construction; Movements of the Distribution and Expansion Valves; Rules and Practical Data*, Steam engines: low-pressure condensing engines without expansion valve, Diameter of piston, Velocities, Steam pipes and passages, Air-pump and condenser, Cold-water and feed-pumps, High-pressure expansive engines, Medium pressure condensing and expansive steam engine, Conical pendulum or centrifugal governor.

OBLIQUE PROJECTIONS.—Application of rules to the delineation of an oscillating cylinder: Plate XLI.

PARALLEL PERSPECTIVE.—Principles and applications: Plate XLII.

TRUE PERSPECTIVE.—Elementary principles: Plate XLIII., Applications—flour mill driven by belts: Plate XLIV. and XLV., Description of the mill, Representation of the mill in perspective, Notes of recent improvements in flour mills, Schiele's mill, Mullin's "ring millstone," Barnett's millstone, Hastie's arrangement for driving mills, Currie's improvements in millstones; *Rules and Practical Data*, Work performed by various machines, Flour mills, Saw mills, Veneer-sawing machines, Circular saws.

EXAMPLES OF FINISHED DRAWINGS OF MACHINERY.—Plate A, balance water-meter; Plate B, engineer's shaping machine: Plate C D E, express locomotive engine; Plate F, wood planing machine; Plate G, washing machine for piece goods; Plate H, power loom; Plate I, duplex steam boiler; Plate J, direct-acting marine engines.

DRAWING INSTRUMENTS.

☞ The above, or any other of my Practical and Scientific Books, sent free of postage to any part of the country; every reader of the SCIENTIFIC AMERICAN is particularly invited to send for a catalogue, which will be forwarded free of postage. HENRY CAREY BAIRD, Publisher of Practical and Scientific Books, 406 Walnut street, Philadelphia. 18 2

TO INVENTORS.—THE UNDERSIGNED HAS GOOD facilities at his place of business in this city to sell a really valuable and merchantable article secured by patent. He might be disposed to advance some capital, and to manufacture the same, if necessary. Address HERMAN J. ROSENCRANZ (care of J. SCOTT), New York. 18 4*

DON'T FORGET, SUPERIOR DOUBLE SAW-BENCHES, $55. Circulars sent. C. P. S. WARDWELL, Lake Village, N. H. 18 4*

CALORIC ENGINE WANTED—SECOND-HAND—suitable for working a small pump. Address Box 1,470, New York Post-office, stating power, and how long it has been in use. 1*

10,000 GALLONS.—WANT TO BUY THREE or four large boilers, or tanks, to hold from 3,000 to 10,000 gallons each. Any one having such, which they will offer cheap, will find a purchaser by addressing P. C., Box 3,488, New York Post Office. 18 2

TO PERSONS ENGAGED IN MANUFACTURING ARTICLES used in Woolen Mills.—I desire to obtain the address of all persons engaged in manufacturing articles used in Woolen Mills, such as Reed-makers, Shuttle-makers, Bobbin-makers, Picker-makers, Comb-makers, &c.; also manufacturers of Patent Oil-cans, Patent Temples, Patent Heddles and all other patented articles used or connected with Woolen Mills. Parties interested please take notice and send their business card to THOMAS STIBBS, Dealer in Manufacturers' Supplies, Wooster, Ohio. 17 tf

FISH'S LAMP-HEATING ATTACHMENTS—FOR FAMILY cooking purposes; for nursery and sick room; for barber-shops and restaraunts. Adapted to kerosene or gas. A fully illustrated pamphlet will be sent by mail free. Agents wanted. WM. D. RUSSELL, agent, 559 Broadway, New York. ☞ Will remove to 206 Pearl street on May 1st. 18 2*

DEAF! DEAF! ARTIFICIAL EARS FOR THE DEAF. Send for a descriptive pamphlet to E. HASLAM, 32 John street, New York. 18 3*

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OFFICE OF THE SIGNAL OFFICER.

WAR DEPARTMENT,
WASHINGTON, D. C., April 11, 1863.

Sealed Proposals will be received at this Office until 4 o'clock, P. M., on the 30th day of April, 1863, for furnishing to the Signal Department the following articles:—

300 Three hundred Telescopes, complete.
200 Two hundred Marine Glasses, do.
250 Two hundred and fifty Compasses.
40 Forty Telescopes, extra size, with stands.

The first delivery to be made about the 15th day of June, 1863, or as soon thereafter as Government may direct; the balance to be delivered on or before the 1st day of August, 1863.

A bond, with good and sufficient security, will be required.

Proposals from disloyal persons, or where the bidder is not present to respond to his bid, will not be considered.

The names of firms should be stated in full, with the precise address of each member of the firm.

All bids to be accompanied by two guarantees, and directed to Signal Officer of the Army, and endorsed "Proposals for Field Signal Equipments."

Form of Guarantee.

We, ——, of the county of ——, and State of ——, do hereby guarantee that —— is able to fulfill the contract in accordance with the terms of his proposition, and that should his proposition be accepted he will at once enter into a contract in accordance therewith.

Should the contract be awarded to him we are prepared to become his securities.

(This guarantee must be appended to each bid.)

The responsibility of the guarantors must be shown by the official certificate of the clerk of the nearest district court, or of the United States District Attorney.

The right is reserved to reject all proposals if the prices are deemed too high, or if, for any cause, it is not deemed for the public interest to accept them.

Models will be on exhibition at the office of the Signal Officer for fifteen (15) days from date. 17 2

BUREAU OF ORDNANCE.

NAVY DEPARTMENT,
Washington City, April 1, 1863.

This Bureau is desirous of ascertaining whether rifled cannon can be made of wrought iron of sufficient and uniform endurance and economy to warrant their being preferred to guns of cast iron only, or of cast iron strengthened with wrought iron.

Proposals will therefore be received from any manufacturers of forged iron, to furnish a finished gun, or a block of metal from which the same may be finished.

The said gun, when finished, to weigh about 10,000 pounds, to be made into a gun throwing a projectile of 100 pounds, as used in cast iron rifled cannon of like weight, to be fired 1,000 times with service charges of the same weight and kind of powder as used in the Parrott 100-pounder, viz: 10 pounds of No. 7, without bursting or wearing in such a manner as to cause apprehensions of bursting.

The quality of metal, price, and other terms, are to be stated clearly in the proposals forwarded.

The Bureau reserves the right to itself of accepting or rejecting any of the proposals.

The time for receiving the proposals is limited to sixty days from date; and proposals will only be received from persons actually engaged in the fabrication of wrought iron.

JOHN A. DAHLGREN, Chief of Bureau.
15 8

ORDNANCE OFFICE,

WAR DEPARTMENT,
WASHINGTON, March 3, 1863.

PROPOSALS will be received at this office until 4 o'clock P.M. on the 30th of APRIL, 1863, for furnishing six hundred Wrought-iron Beams for Rails of Chassis of Sea-coast Carriages.

These beams are to be made after the following specifications:—

The rail for barbette carriages is a rolled wrought-iron beam, similar in appearance to the "I"-shaped beams used in the construction of fire-proof buildings. It is required to be straight and smooth on its surface, and free from flaws, imperfect welds, blisters and cinder streaks. The outer surfaces of the two flanges are planes, parallel to each other, and at right angles to the web. The web joins the two flanges along their middle line, leaving them to project equally on each side, and must be without bends or corrugations.

DIMENSIONS OF BEAMS.

Length of rail	171	inches.
Depth between outer surfaces of flanges	15	"
Width of flanges	5·375	"
Thickness of flange at outer edge	·75	inch.
Thickness of web	·625	inch.

These beams will be inspected after the following rules:—

They are to be made of good tough well-worked clear iron, the absence of which qualities (generally indicated by roughness of surface, and by checks and more marked roughness along the edges of the flanges), as also flaws, or bad welds, blisters and streaks of cinder will cause their rejection.

1st. They are to be of the required dimensions and square at the ends.

2d. They are to be straight and free from short bends in the flanges and webs.

3d. The outer plane surfaces of the flanges are to be parallel to each other, and in planes perpendicular to that of the web.

4th. The webs are not to be bent or *troughed*, as would result from resting the rails along their whole lengths on the edges of the flanges, while the webs are too hot to bear their weight.

5th. The flanges are to be perfectly equal on each side of the web.

VARIATIONS ALLOWED IN INSPECTING.

In length of rail	·50 inch.
In depth of rail	·10 inch.
In thickness of web	·05 in .
In warp or wind, in depth of flange at extreme end of rail	·10 in .
Difference in distance between outer edges of plane surfaces of flanges on different sides of web at any cross section of rail	·10 incn.
A straight edge of equal length with the rail placed on the outer edge of the flange should not depart from it at any point more than	·15 inch.
A plane surface placed on the web should not depart from it any point more than	·10 inch.
A plane surface placed on the plane surface of either flange should not depart from it at any point more than	·10 inch.
Departure from square in depth of rail	·15 inch.

Specimens of the beams, or drawings of them, can be seen at the United States Arsenals at Fortress Monroe, Va., Bridesburg and Pittsburgh, Pa., and Watertown, Mass.

Bidders will state the number of beams they propose to furnish, the time when they will commence the delivery, which should be as early as possible, and the number they can deliver weekly after commencing delivery, place where they will make them, and the price per pound for which they will deliver them at the point of vessel or railroad shipment nearest to their works.

No bids will be entertained except from persons actually engaged in the manufacture of iron, evidence of which must accompany the bid.

Each party obtaining a contract will be required to enter into bonds, with proper sureties for its faithful fulfillment; and the transfer of the contract to another party will cause its entire forfeiture.

The right is reserved to reject all proposals if the prices are deemed too high, or, if for any cause, it is not deemed for the public interest to accept them.

Proposals will be sealed and addressed to "GENERAL J. W. RIPLEY, Chief of Ordnance, Washington, D. C.," and will be indorsed "Proposals for Wrought-iron Beams." JAS. W. RIPLEY,
16 3 Brigadier-General, Chief of Ordnance.

WANTED.—A SECOND-HAND ENGINE LATHE that will swing 48 inches over ways. Short ways preferred. The price must be low. Address MACHINIST, Box 167, Houghton, Mich. 17 2*

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A VALUABLE WORK FOR INVENTORS, PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared, with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents:—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them—Importance of the Specification—Who are entitled to Patents—What will prevent the Granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but also to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

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TRIP HAMMERS.—WE ARE MANUFACTURING Howell's Patent Trip Hammers (illustrated in No. 2, Vol III., new series, SCIENTIFIC AMERICAN) to which the attention of those interested is invited. Descriptive circular and references to those who have them in use mailed to all applicants. JAMES L. HAVEN & CO., Nos. 173, 175 and 177 West Second street, Cincinnati, Ohio. 14 6*

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A MESSIEURS LES INVENTEURS—AVIS IMPORTant. Les Inventeurs non familiers avec la langue Anglaise et qui préféreraient nous comm uniquer leurs inventions en Frangais, peuvent nous addresser dans leur langue natalle. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront regues en confidence. MUNN & CO.,
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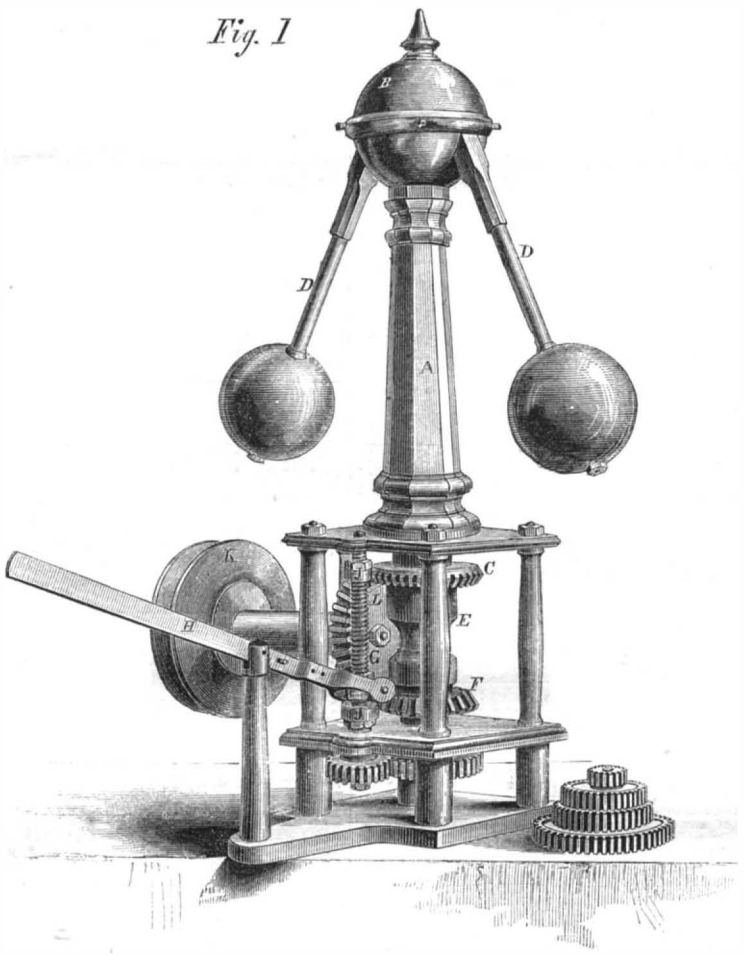
Improved Patent Governor.

All our readers are so familiar with the uses to which the invention herewith illustrated is applied, that we forbear any comments upon this branch of the subject and proceed at once to describe the apparatus, which in its arrangement and design is both novel and praiseworthy. The column, A, has the hollow spherical head, B, attached to a tube running through the center of the column connected at the bottom with the crown gear, C. This case contains a rod which has a shoulder on it in which the ends of the levers, D, work. The clutch, E, is secured to

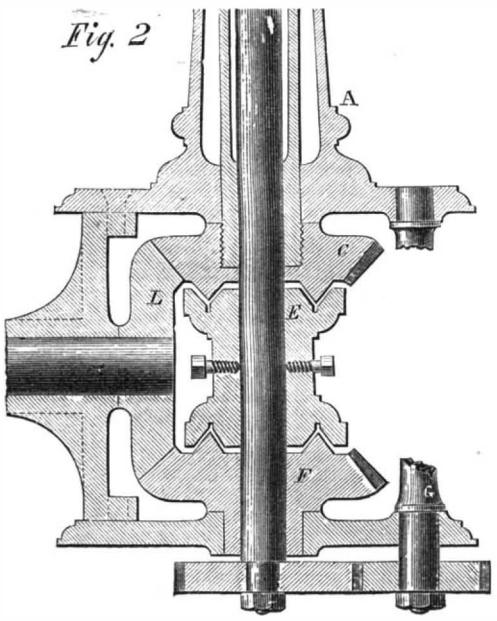
Fig. 1



HOWELL'S PATENT GOVERNOR.

the rod just mentioned by set-screws. In either end of the clutch there is a V-shaped groove which is accurately fitted to corresponding projections on the gear, C and F, (see Fig. 2).

Fig. 2



Below the two standard plates on which the machinery is placed may be seen a spur wheel connecting with a pinion; this wheel is keyed on to the same rod that carries the clutch and operates, through the pinion just mentioned, the screw shaft, G. The lever, H, is jointed to the upright, and the forked end of it connects with a nut working on the screw shaft. At either end of the screw shaft are two stationary nuts, J, which can be set at any desired point. The pulley, K, transmits power from the engine to the whole apparatus through the bevel gear, L. These are the principal details of the apparatus. The operation of them will be understood by referring to the annexed description :—

When the balls are revolved they maintain a position whose distance from the column is proportioned to the speed at which they travel; as they rise or fall by an increase or decrease in the number of the revolutions, the clutch is thrown into communication with the upper or lower gear and thus rotates the gear connecting with the screw shaft. As the screw shaft moves in obedience to the machinery, the nut in the lever runs up and depresses the opposite end of the same, which is in connection with the steam or throttle valve. The whole duty of the balls is exerted on the friction clutch; the motion is very slight, as the distance between the clutch and the gears it drives is only one-sixteenth of an inch. The gears placed at the side of the machine are intended to accelerate the speed of the screw shaft as may be desirable. This is a necessary feature and it strikes us that if the screw shaft itself had a quicker pitch on it the apparatus would be still more effectual. As it is, when properly made, it must be a sensitive governor, and we are assured that it gives great satisfaction in the navy yard at Portsmouth, N. H., where it is now used. This governor was patented on Dec. 23, 1862, by John S. Howell, of Portsmouth, N. H., and further information can be had by addressing him at that place.

Electro-metallurgy.

This term is applied to the art of depositing metals upon one another, or upon non-metallic bodies—an important invention, which dates from about the year 1840. At the present time numerous persons are engaged in this business in Sheffield, Birmingham, and London. The simplest mode of operating is to employ in one cell Smee's or Daniel's battery, for the purpose of generating the electric force; then to have a second vessel, of a size sufficient to hold the article to be coated with metal. If it be intended to coat the object with copper, then this vessel must be filled with a saturated solution of sulphate of copper, and a sheet of copper placed into it. This is connected by a wire to the copper of the battery, another wire is made to connect the zinc of the battery with the object to be coated. The battery being set in action with weak sulphuric acid and water, the deposit of metal takes place without further trouble. If the article is to be coated with silver, then a solution of cyanide of silver is used, and a silver plate, instead of the copper-salt and plate mentioned. Every metal can be thus deposited from its solution when the proper salt of the metal is employed. If the object to be coated is metal, nothing but absolute cleanliness is necessary; but if the object be wax, plaster-cast, wood, &c., then it must be brushed over with fine black lead, in order to make the electric fluid travel, all objects except metals being non-conductors. Beginners should commence with small objects, as a little experience is necessary to lead to satisfactory results.—*Septimus Piesse.*

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To the Inventor!

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come, but each number contains an Official List of the Claims of all the Patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week, the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in those old countries. We shall continue to transfer to our columns copious extracts from those journals of whatever we may deem of interest to our readers.

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FROM THE STEAM PRESS OF JOHN A GRAY

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